

# POPULAR Computing WEEKLY

35p 26 May-1 June 1983 Vol 2 No 21

40lock

## This Week

### Spectrum utilities

Tony Bridge weaves his way through a maze of utility programs including Masterkey, Disassembler and Machine Code Test Tool. See page 13.

### Dragon keyboard

Peter Chase presents a m/c routine to enhance keyboard responses and extend the use of colour on the Dragon. See page 22.

### ZX81 label maker

R Luxton explains how to make your own labels on the 16K ZX81 on page 17.

### New releases

All the latest software releases including news of Valhalla, an animated graphics adventure for the Spectrum. See page 53.

**STAR**  
Depth Charge  
on Vic20.  
See page 10.

**GAME**

## Classified

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## News Desk

### Dragon goes across the pond!

DRAGON microcomputers will go on sale in America in August.

This is the result of negotiations, now in the final stages, between Dragon Data and the American manufacturer Tano, who will assemble, distribute and sell the computer in the US.

The American Dragons will be the first fruits of a new joint venture, set up by the two companies, called Dragon Tano Inc. Dragon Data holds a 49 percent share in the new company — Tano holds the remaining 51 percent.

Tano will begin by manufacturing 2,000 machines a week, supplemented initially by machines built by Dragon in this country.

The Dragon 32 will sell for \$300 (about £185) and the Dragon 64 will sell for \$400 (about £250). As well as being adapted to work with the US NTSC television system, the American Dragons differ from their UK relatives in that they

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Continued on page 4

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## Softek compiler payments dispute

SILVERSOFT and Softek have clashed head-on in a dispute over royalty payments for a program written using a compiler.

The argument concerns the Silversoft program *Slippery Sid* which was written using the *Super C* Spectrum compiler from Softek.

Softek is claiming that Silversoft has infringed copyright and broken a contract of sale of the *Super C* program, by using the compiler to develop a commercial arcade game without permission. The company is insisting — and Silversoft is steadfastly denying — that a royalty payment must be made by Silversoft to Softek on every *Slippery Sid* tape sold.

Softek is now considering legal action, possibly involving an

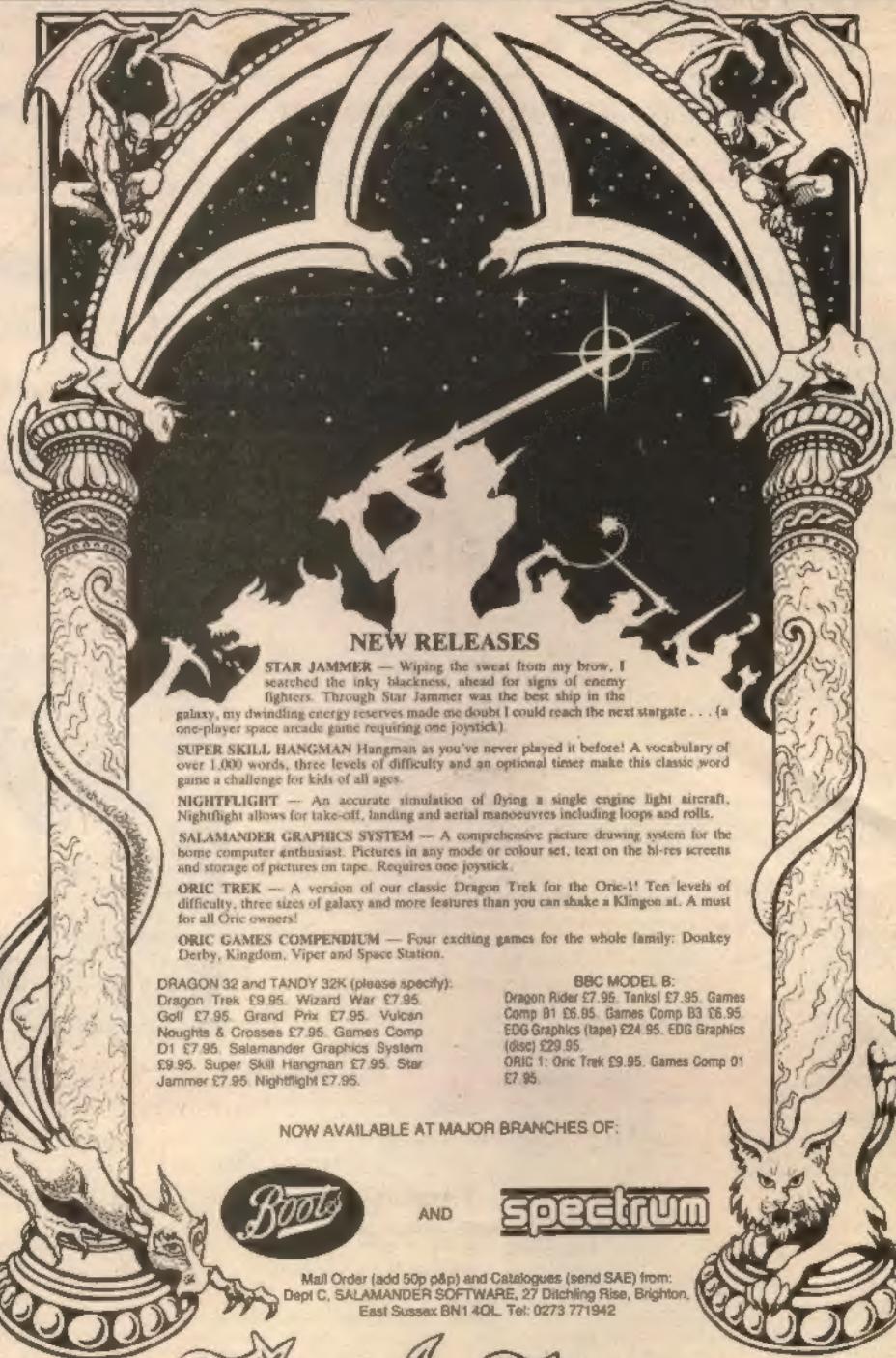
junction this week, to halt sales of the *Slippery Sid* program pending resolution of the dispute.

Softek's Tim Langdell explained that the *Super C* program — written by Andrew Glazier — is sold subject to the condition that it is not used to write commercial programs:

Continued on page 4

★★ADVENTURE COMPETITION—WIN A 64★★

# WINDOW ON ANOTHER WORLD



## NEW RELEASES

**STAR JAMMER** — Wiping the sweat from my brow, I searched the inky blackness, ahead for signs of enemy fighters. Through Star Jammer was the best ship in the galaxy, my dwindling energy reserves made me doubt I could reach the next stargate... (a one-player space arcade game requiring one joystick).

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**Salamander Software**

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should be original. It is breaking the law of  
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and submit them here — so please do not  
be tempted.

All submissions should be typed and a double  
space should be left between each line. Please  
leave wide margins.

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We cannot guarantee to return every submitted  
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you want to have your program returned you  
must include a stamped, addressed envelope.

### Accuracy

*Popular Computing Weekly* cannot accept any  
responsibility for any errors in programs we  
publish, although we will always try our best to  
make sure programs work.

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## Editorial

The decision to hold a General Election  
on June 9 has resulted in the  
death of the Data Protection Bill. With  
insufficient time left to pass the Bill  
before the dissolution of the present  
Parliament, the government decided  
to drop it.

The Data Protection Bill, you may  
remember (*Popular Computing Weekly*,  
31 March — 6 April), was bitterly  
opposed by a variety of groups includ-  
ing the British Medical Association  
and the Law Society.

However, it looks likely that the Bill  
will be resurrected after the election  
if the Tories are re-elected.

Opponents of the Bill are not  
against data protection legislation as  
such, but they are concerned that  
there should be adequate safeguards.  
The old adage of garbage in/garbage  
out is particularly applicable. If there  
are no checks on what goes into a  
computer, there will be few on what  
comes out.

Perhaps there is a need for some  
sort of data protection ombudsman —  
an independent guardian conversant  
with the intricacies of computer re-  
cords.

Data protection is an extremely  
thorny subject, but it is one that will  
affect all of us. The time to lobby the  
government for adequate safeguards  
is now — it will be too late once a new  
Bill has been passed.

## Next Thursday

See if you can avoid the aliens in this  
Invader's type action game, where you  
are the city bomber trying to keep clear  
of the flying anti-matter discs! New York  
— next week's Star Game for the 16K  
Spectrum by P. Watson.

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## Compiler dispute

Continued from page 1

"If it is used in this way then the software house must reach agreement with us over a royalty payment. This is individually negotiated with each software house concerned, but is typically around five percent of the wholesale price.

"We think that this is a small price to pay for the saving that the *Super C* program makes in terms of the time needed to create a machine-code program.



Andrew Glaister

"If this is unacceptable, then the purchaser can send it back and we will refund the money.

Silversoft bought our compiler in December and used it to produce the *Slippery Sid* program, without negotiating a royalty payment with us.

"What they appear to be saying is that they don't agree with the idea of royalties on compilers."

Softek claims copyright has been infringed in the so-called run-time routines in the *Super C* program that are used in the *Slippery Sid* program. Explained Tim: "Our compiler is different from other compilers found on main-frame and mini-computers. *Super C* produces a sort of mini-Rom. Instead of calling routines from the Spectrum's Rom it uses its own — which actually form part of any program written using the compiler. When a character is printed on the screen it is our run-time routine that does that."

Silversoft's David Patterson vigorously denies that any copyright has been infringed or contract breached in Sof-

tek's compiler: "Tim's main argument is that his compiler goes through a two-stage operation. The main compiler takes the Basic source code and converts it into machine-executable code. The second part of the program then executes it. He is claiming that because the executive code is an integral part of the program then we are in breach of his copyright. That is like trying to sell a paint-brush without a handle.

"We have absolutely no intention of paying a royalty to Softek on each *Slippery Sid* tape sold, and if he wants a fight then he's picked the right company.

"We bought his compiler by mail-order and there was no mention that Softek wanted to charge a royalty on programs developed using it in the mail-order advertisement — at the point of sale.



David Patterson

"When you write a programming tool like a compiler you either keep it to yourself or put it in the public domain. Trying to charge a royalty on programs written with it is laughable. We have no intention of doing anything about his request for a royalty and if he wants to sling mud — let him go ahead."

• Andrew Glaister, who wrote the *Super C* program for Softek, is a former Silversoft programmer. He wrote *Orbiter* for them last year. He receives 25 percent of any income gained by Softek on the *Super C* compiler, either through sales of the compiler itself or from royalties on programs written using it.

patible computer which they import from the Far East and they will use the dealer network set up for that product to sell the Dragons. At the same time we will hope to expand the network to pick up a considerable number of new dealers."

Tano is based in New

## Design your own Forth micro!

POTENTIAL purchasers of a new Forth microcomputer are to be consulted over the final design of the machine.

The new machine, as yet unnamed, will be designed and manufactured by Remsoft and Advanced Test Systems.

It will run Forth, be priced between £300 and £500 and the first prototypes should be working by the end of June. The computer will be 6502-based with either 64K or 128 K Ram, 16K Forth 79 Standard Rom and an on-board disc operating system for Sony 3½ inch 70 track micro floppy disc drives.

Other features are yet to be determined and will be decided by potential purchasers of the machine. Advertisements will be placed in a variety of magazines inviting members of the public to fill out a questionnaire to help determine the final specification of the new machine. It will probably have an RS232, Centronics and RGB outputs, have a bit-mapped screen display in eight colours and a second Rom port.

## Dragon drop their prices

DRAGON Data has cut the price of the Dragon 32 computer from £199.50 to £175.

First to react was Boots who introduced the new pricing last week and other retailers are expected to follow.

The price drop is recognised as a reaction to cost cutting two weeks ago of the Sinclair Spectrum machines. Boots' merchandising controller, John Flatman, commented: "It is a general trade price reduction which we think retains the correct price differential between the Dragon and the Spectrum."

Orleans and began by manufacturing control systems for the oil, gas and shipping industries.

Dragon has been looking for a suitable US manufacturer since the autumn of last year and the computer was first exhibited over there at the Comdex Fair in Atlanta this year.

Remsoft already supplies a range of software for the Jupiter Ace Forth micro and plans to convert much of this material for the new machine in time for its launch later in the year. A word processing package and database program are also planned.

Explained Paul Wynter of Advanced Text Systems: "It is an experiment but, for the first time, the public will play a part in the design of a machine they might buy."

"The design is an up-rating of an existing 6502 board that we currently manufacture. The exact form of that up-rating is still very much undecided — and what form it will take depends very much on the results from our questionnaire."

If you would like to take part in the survey then write for your questionnaire to Remsoft, Freepost, Brighton BN1 1ZW.

## Cyborg disc drive versions under way



CYBORG'S 5½ inch disc drive is now working with the ZX81, Spectrum and Oric computers and work is under way on versions for the Vic20, Commodore 64 and Dragon.

The system's claim to fame is that the discs are transportable from machine to machine involving only a change of connector. This is possible because the disc operating system is designed with its own 6500/12 processor on board and the operating system software need therefore not be compatible with the host micro (see Popular Computing Weekly, May 5).

The system should go into production some time in late June.

## Across the pond

Continued from page 1  
are equipped with an RS232 interface as standard.

Tony Clarke, Dragon's managing director, explained the strategy for the US: "Tano already sell an Apple com-

## Low-cost networking



A LOW-COST simple 'networking' system for any machines that load from an ordinary cassette player is available from Network Computer Systems.

The Multiload system makes use of a computer's Save and Load commands to direct programs from one machine to another.

No facility is provided to protect against message collisions but a four-computer arrangement costs only £6.95. Additional connecting cable costs around 50p per metre.

The system will only transfer information satisfactorily between computers of the same type, but will work with ZX81s, Spectrums, BBCs, Orics and Aces.

Details from Sue Clarke, Network Computer Systems, 39 Bampton Road, Luton, Beds.

### Timex dispute at an end

THE sit-in by 350 workers at the Timex plant, which had halted development work on the Sinclair Research flat-screen tv project, has ended.

Normal working is due to be resumed this week, bringing to an end a dispute which has lasted for more than six weeks. Union officials of the AUEW and TASS have accepted an agreement involving 425 more job losses, delayed for 90 days.

Clive Sinclair commented that he was "absolutely delighted" that the dispute has been resolved.

### Now it's Ms Pac-Man!

If you hoped you had seen the last of Atari's gobbling *Pac-Man* then you will be disappointed.

Now the company is offering a follow-up — *Ms Pac-Man*. Atari claims "this little lady is a screen sensation, more dynamic and more talented than even *Pac-Man* himself!"

*Ms Pac-Man* is a cartridge for the Atari VCS and costs £29.99.

### Sinclair Joystick option

THE Sinclair Research Rom cartridge adaptor (see *Popular Computing Weekly*, May 19) will also operate as a joystick interface.

The joystick port has been in the pipeline for some time. Indeed, some software packages from Psion — *Hungry Horace* for example — contain the necessary software hooks to run with the joystick.

- There is still no sign of the Sinclair £40 microdrives — originally mooted over a year ago. Although much of the development work is now complete, industry sources suggest that Norfolk-based DK Tronics has been brought in to assist with the project.

### Argus cassette magazine

ARGUS Specialist Press, publisher of *Computer Today*, *ZX Computing* and *Micro Update*, is to launch the first magazine for computer users written entirely on cassette.

The cassette magazine —

## Memory expansion boards for the BBCs

JOHN Richardson Computers plans a range of add-on memory expansion boards for the BBC microcomputer.

The company will sell 64K and 128K boards which, just like a Ram pack, simply plug into the computer via the 1MHz bus.

Although not addressable from the machine's Basic, the memory is seen by the computer as a 'book' of pages each containing 256 bytes. Access to the pages is via machine-code *Peeks* and *Pokes*. Just as with an array, it is possible to *Peek* in and *Poke* out of the pages keeping track of the page number.

The pages can be used to store data or sections of completed programs. Four pages can be linked together to hold a single screen of information. Such a technique could hold

displays used in simple animation or perhaps locations in a graphics adventure.

"The big limitation with the BBC machine," explained company founder, John Richardson, "is its memory. The advantage of our system compared with loading information off discs is speed. We can use a full 64K to store something like a mailing list or telephone directory in alphabetical order and get out data much quicker than is possible with a disc."

The 64K board should be available by the end of June and will cost around £140. The 128K board will follow at a price in the region of £175. More details from John Richardson Computers Ltd, Unit 337, Walton Summit, Bamber Bridge, Preston, Lancs.

### Oric joins up with Cosmic in the Orient!

ORIC has formed a new company to manufacture and sell its computers in Japan and South East Asia.

The new venture — Oric Japan — is half-owned by Oric Products and half-owned by a consortium including one of Oric's far east manufacturers and Cosmic, a Japanese retail chain.

Oric's manufacturers are making the necessary changes

to the machine to operate with Japan's NTSC television system and Oric are also developing software which will run using the Japanese Kana character set.

Sales of the Oric computer in Japan are planned to commence in July.

- It is also hoped that a version of the NTSC Oric will be produced by the same manufacturer for sale in the US.

### Microfairs to be held in June

THE beginning of June sees shows in London for both Sinclair and Commodore.

The 7th ZX Microfair will be held at Alexandra Palace on Saturday, June 4. Entry costs £1 and the fair will be open from 10 am to 6 pm on Thursday and Friday and from 9 am to 5 pm on Saturday.

The 4th International Commodore Computer Show will be held at the Cunard International Hotel, Hammersmith from Thursday, June 9 to Saturday, June 11. Again, entry costs £1 and the show will be open from 10 am to 6 pm on Thursday and Friday and from 9 am to 5 pm on Saturday.

### Texas price reduction

Correction: To take full advantage of Texas Instrument's special price deal for the 99/4A computer (see *PCW*, May 19) it is necessary to buy a selection of software cartridges.

To get a free Speech Synthesiser — worth £49.95 — or cassette recorder, you must also purchase six TI Rom software packs.

# ZX MICROFAIR

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7th  
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Please make cheques payable to ZX MICROFAIR and enclose S.A.E.

### CUT OUT AND KEEP HOW TO GET TO THE BIG SHOW.

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By London Transport  
Underground: Victoria Line from Victoria (also Oxford Circus, Kings Cross/St Pancras) to Alexandra Palace — change for Suburban Service to Alexandra Palace — free shuttle bus or 5 minute walk from there!

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# LETTERS

## Sensible solution?

I am writing to you on two subjects — the inevitable software library topic and the letter from Ashley Buss in your March 31 issue.

Dealing with the latter first, may I suggest to your reader that he refers to the Dragon manual (p. 17) for the easy method of listing programs, ie, pressing Shift and @ together to stop the list at any point and then pressing any key to continue.

On the subject of software libraries, I find the attitude of certain manufacturers hard to accept. I know that this is a young industry, but surely some sense must prevail soon.

Instead of trying to fight the libraries, why do the manufacturers not enter into agreements with them? A similar situation to this happened in the video industry until the major companies realised that the market was primarily interested in renting tapes. Consequently, instead of selling their tapes to dealers, the video companies entered into rental agreements.

Now, I know that renting a film is not quite the same situation as renting software, but there are similarities. It does not matter how good the software is, there comes a time when its appeal wears off, and then what happens? It is swapped or sold to a friend — albeit illegally.

I am a member of a software library, and I find its services invaluable. I have, in the past, bought several tapes (up to £10 each) that were of disgraceful quality and on these occasions have felt somewhat cheated out of my hard-earned cash. Bad software had in fact discouraged me from making purchases for some time.

This is where the software library comes in. If I obtain a poor program, I don't mind having wasted £1.50, and if I obtain a good program, I will support that company again in the future.

One of the most interesting points is that I spend the same amount of money renting instead of buying. Now, assuming that is the situation with everyone else, there must be the same amount of money going into the system. There-

fore, it is just a question of getting the distribution of this money right.

There seem to be two alternatives. Firstly, the manufacturers could rent libraries their tapes on a monthly basis instead of selling them. Secondly, manufacturers could charge the libraries about 50p every time they lend a tape.

I am sure that given a sensible arrangement, the only people to suffer would be the manufacturers of poor quality software, and that would be no bad thing!

Iain Mackenzie  
16 Dudley Drive  
Glasgow G12 9SB

## Who's to blame?

I feel I must reply to the letter from A J Prestwich (*Popular Computing Weekly*, April 28-May 4) concerning his trouble with obtaining his 32K expansion from ELR for his issue 1 Spectrum.

I also own an issue 1 and have received and fitted an expansion from ELR, and I don't really believe ELR should take all the blame. Sinclair has released more issue 1s than it has led people to believe and I will be very interested to see if Sinclair produces an expansion for it. By the way, my expansion operates perfectly even after one stretch of eight hours non-stop use.

PS. I thought Clive Curry's *Magical Software* letter was hilarious.

G Bloomfield  
Britannia  
7 Edmund Close  
Downend  
Bristol BS16 5EJ

## Free reign with railcards!

Hot on the heels of sensational revelations in certain magazines last week, concerning software houses and the cars their employees drive, Bug-Byte's co-director Tony Baden has let it be known that he is awaiting delivery of a Reliant Robin, complete with "GT stripe". Sales Manager John Phillips and Assistant Sales Manager Barbara Smathers share a 1973 Mosk-

wich van and newly appointed creative and artwork head Les Harvey is believed to have ordered a Skoda Estelle. "Even though it's a bit flash," he says.

The rest of the staff have unlimited access to all buses and trains. "We allow them a free reign with their student railcards," says Baden. "And our UK Office Manager, Matthew Thomas, who I believe is 12, has his sister's bike." Baden hopes the news will not upset the company's customers. "I'd hate them to think we were wasting their money," he said.

Stop Press. Harvey distraught. Estelle not available. Yugo ordered.

Matthew Thomas  
Bug-Byte  
100 The Albany  
Old Hall Street  
Liverpool L3 3AB

This letter follows a news item about Imagine Software and its new range of company cars in *Home Computing Weekly*, May 17-23. We are eagerly awaiting new developments in this Liverpudlian saga. Watch this space.

## Extended life!

Users of microcomputers may have seen a parallel between computer software and what has been known as the "soul" of a person, occupying the body's computer, the brain. The conclusion may have been drawn that were it possible to somehow record the program from the brain, then immortality could result, if it could be played into a replacement body.

Such science-fiction may well become fact, but not within the lifetimes of many of those now living. However, some Americans have been exploring the ideas of cryonic suspension, where the bodies of deceased people are stored in liquid nitrogen until such time as the freezing damage, cause of death and ageing damage can be reversed.

Work is in progress to enable British people to take part in the cryonics program, and the cost needn't be high within life, as long as sufficient assets are available upon death to pay for suspension and stor-

age. As you can't take them with you, the perceived financial loss if this unproven process doesn't work needn't be high. An associated group is also working on ways to retard ageing now, and collates available scientific information as well as funding its own research. It has achieved much publicity from appearances on US television and the publication of a best seller, *Life Extension - A Practical Scientific Approach* (Pearson & Shaw, Warner, \$20, 1982).

I have been researching the cryonics and life extension programs, and can send free details to anyone interested.

John de Rivaz  
West Town House  
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## One Point Two

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Time and again the wise men have joyously foretold the coming of *One Point Two* throughout the realm. They look deeply into their crystal balls but often and sadly do turn away, their cash tills silent.

I have conversed with travellers and those in far places demanding of them "what doth the creature resemble". Though many have heard tell of it, I have met none who have yet seen it.

Despairing then will hie me hence to a monastery or a Sinclair or a Dragon or anywhere that reacheth specification. Ere go I must forewarn my family, friends and neighbours against th'illusions of life and the Model B.

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POSITION	A1	RC	SPACE	B1\$B5	T	C	D
	A	B	B	B	C	D	E
1	- J.B. SNOOKER T/A POT - BLACK						
2	PROJECTED CASH FLOW						
3							
4							
5							
6							
7	INCOME						
8	Sales			11786		10944	
9							
10	REVENUE EXPENDITURE						
11	Purchases			500		500	
12	Advertising			500		1000	
13	Director's salary			1596		1596	
14	Salaries			2216		2216	
15	Rent						
16	Telephone					300	
17	Insurance					200	
18	Printing, stationery					400	
19	Repairs & renewals						
20	Hire of equipment			60		60	
	COMMAND BCDEFGPRSTW?						

Without any programming knowledge at all, you may:

- Set up a computerised spreadsheet, with chosen row and column names.
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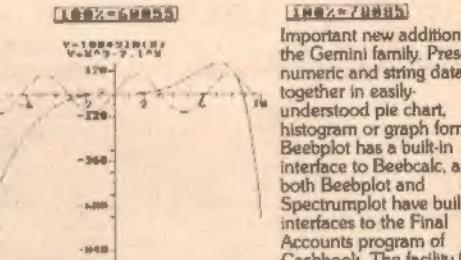
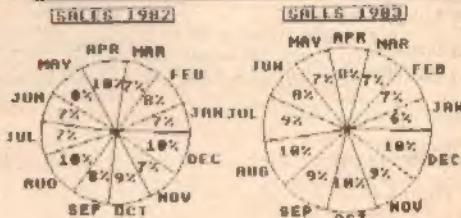
Some typical applications:-

- Small business accounting applications, e.g. profit and loss statements and cashflow projections, break-even analyses etc.
- Investment project appraisal—anything from double glazing to oil rigs!
- Comparing rent/lease/buy options.
- Processing the results of scientific experiments or field studies.
- Engineering calculation models.
- In fact, anything that involves repeated re-calculation of results presented in tabular or spreadsheet format.

## Program Availability Chart:-

	Database	Logic	Control	Matrix	Finance & Controlling	Statistical Analysis	Graph	Calculus	Accounting	Word	Graphics	Flow	Network	Commercial Accounting	File	File Management
Saturn Spectrum 16k or 40k	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Dragon 32k or 80k	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
VIC 20 16k +1	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Sinclair ZX81 16k +1	●															
Grandy Rainbow	●															
Sharp MZ20A	●	●	●	●	●					●	●					
Sharp MZ20X	●	●	●	●	●					●	●					
Sharp MZ20B	●	●	●	●	●					●	●					
BBC Micro model A or B 32k	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Atari 400/800	●															
Torch	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Siemens HX-20	●															
Commodore 64	●															

## BEEBPILOT & SPECTRUMPILOT £19.95 NEW



Important new additions to the Gemini family. Present numeric and string data together in easily-understood pie chart, histogram or graph format. Beebplot has a built-in interface to Beebcalc, and both Beebplot and Spectrumplot have built in interfaces to the Final Accounts program of Cashbook. The facility for mathematical function plotting is also provided. The BBC version has a high resolution screen dump for the Epson or CP-80 printers, and the Spectrum version dumps to the Sinclair printer via the 'copy' key. A very useful program that will give superb results either from direct input of data from the keyboard or via simple access to other software data files. A must for business and education.

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Scissors icon

# Depth Charge

A new game for the Vic20 by Robert Irvine

In this game you are a warship patrolling the ocean, trying to clear 11 of enemy submarines. You move with the joystick, left, right, and use the fire button to drop a depth charge.

You have 20 depth charges to score as many points as possible. The lower a sub is in the water, the more points it is worth.

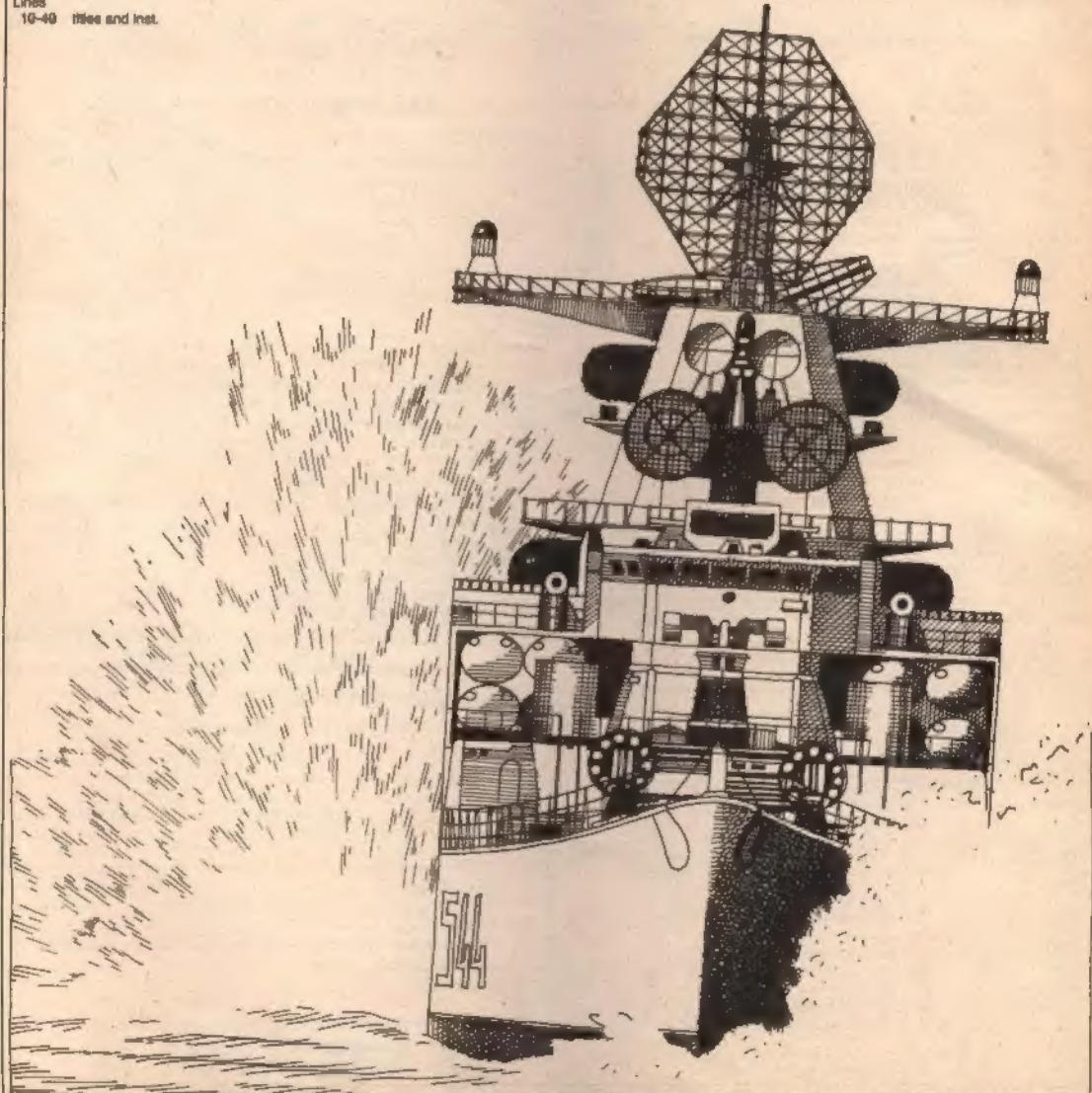
61-71 user def. graphics and joystick pokes  
108-138 set up screen and define variables  
139-148 decide where sub comes from and print it on screen  
151-176 joystick peeka  
175 checks if you have charges left  
186 checks if you have hit a sub  
198-238 firing sequence  
309-325 sub hit routine  
498-500 end graphics routine  
508-530 end or restart routine

Variables used  
dp — depth charge position  
sp — ship position  
sr — level of sub (depth)  
sl — start location of 'sub' routine  
se — end location of 'sub' routine  
sv — score value (of sub)  
sc — total score  
fd — depth charge has fallen  
vl — volume level (sound)  
vv — volume level (sound)

## Program notes

### Lines

10-40 title and init.



READY.

```
10 PRINT"DEPTH CHARGE"
15 PRINT"BY ROBERT IRVINE (C)"
20 PRINT"YOU CONTROL THE SHIP."
25 PRINT"TRY TO DEPTH CHARGE";PRINT"THE SUBMARINES THAT"
26 PRINT"MOVE BEHNEATH YOU."
27 PRINT"YOU HAVE 20 CHARGES.";PRINT"THE LOWER SUBS SCORE";PRINT"MORE POINTS"
30 PRINT"GOOD LUCK!!"
35 PRINT"PRESS ANY KEY TO START"
40 GETPP$;IFPP$="THEN40
51 POKE36876,220
55 FORV=7168TO7168+7:IREADJT:POKEY,JT:NEXTY
61 DATA0,0,0,0,0,0,0,0
62 DATA4,4,63,15,255,186,63,31
63 DATA128,128,248,224,225,235,234,252
64 DATA0,0,0,0,14,235,111,63
65 DATA64,224,236,232,232,235,246,252
66 DATA0,0,40,124,40,0,0,0
67 DHTH255,255,255,255,255,255,255,255,169,149,74,170,53,210,74,09
68 DATA16,56,56,16,16,56,16,48
69 POKE36869,235:IF=0:FD=22:DP=0:IM=0:SC=0:IDL=28
71 POKE37151,0:PA=37151:PB=37152:RB=37154
100 REM SET UP SCREEN
105 POKE36879,236:PRINT"@"
110 FORJK=7680TO8185:POKEJK,B:NEXTJK
115 FORH=38510TO38510+22:POKEHN,0:NEXTHN
116 FORLM=38532TO38905:POKELM,6:NEXTLM
120 PRINT"@"
125 SP=78800
126 POKESP,1:POKESP+1,2
130 REM MOVE SUB
131 SR=INT(RND(1)*8):IFSR<1:DRSR=0:THEN130:SE=0:SL=0:IK=0:U=0:Q=0:SG=0
132 VV=15
133 IFSR=2:THENSL=8142:IK=1:U=1:Q=1:SO=20:SV=15:GOTD0146
134 IFSR=3:THENSL=8052:IK=-1:U=1:Q=-2:SO=-20:SV=10:GOTD0146
135 IFSR=4:THENSL=7922:IK=1:U=1:Q=1:SO=20:SV=5:GOTD0146
136 IFSR=5:THENSL=8162:IK=-1:U=1:Q=-2:SO=-20:SV=15:GOTD0146
137 IFSR=6:THENSL=8032:IK=1:U=1:IK=-1:SO=20:SV=10:GOTD0146
138 IFSR=7:THENSL=7942:IK=-1:U=1:Q=-2:SO=-20:SV=5:GOTD0146
140 REM PNT SR
145 SE=9,L=90
147 IFSL>0:SETHENSL=SL+K:POKESL,3:POKESL+U,4:POKESL-Q,0
148 IFVV>0:THENVV=VV-1
149 POKE36878,VV:IFSL=SETHENPOKESL,0:POKESL+U,0:POKE36878,0:GOTD0131
150 PRINT"SCORE":SC:PRINT"CHARGES LEFT":DL":"
151 H=PEEK(PA):POKERB,127:W=PEEK(PB):(POKERB,255
155 IF(BAND128)=8ANDC=1ANDSPC7610THENSP=SP+1:POKESP,1:POKESP+1,2:POKESP-1,0
160 IF(CAND16)=8ANDD=1ANDSP>7790THENSP=SP-1:POKESP,1:POKESP+1,2:POKESP+2,0
170 IF(CAND32)=8ANDDL>0THENNF=1
175 IFDL=0:THENGOTO400
180 IFF<>1:THENGOTO147
185 DP=SP+FD+1
186 IFPEEK(DP)<>0ANDPEEK(DP)>0:STHENGOTO300
190 POKEDP,-5:IFMD=0:THENPOKEOP-22,0
210 M=M+1:IFD>FD+22
220 IFM=17:THENDL=DL-1:POKEDP,0:F=0:FD=22:M=0:DP=0:GOTD0230
230 GOTO147
300 POKEDP-22,0:POKEDP+1,7:POKEDP-1,7:POKEDP,7
310 POKE36876,0:POKE36877,220:FORL=15TO0STEP-1:POKE36878,L
315 FORLL=1TO100:NEXTLL:NEXTL:POKE36877,0:POKE36876,220
320 POKEDP,-8:POKEDP+1,8:POKEDP-1,8
325 M=17:SC=90+SV:SL=SE:GOTD220
480 POKE36878,0:POKE36876,0:POKE36877,128:VL=0
405 POKESL,0:POKESL+L,0:POKESL-L,0
410 POKESP,0:POKESP+1,0:POKESP-1,0
420 POKE7800,1:POKE7801,2
430 POKE8152,3:POKE8153,4
440 FORPM=8131TO7923STEP-22:VL=VL+1
445 POKEPM,8:IFPM=22:GOTO153:THENPOKEPM+22,0:POKE36878,VL
446 FORTJ=1TO100:NEXTTJ
450 NEXTPM
455 POKE7800,7:POKE7801,7:POKEPM+22,0
460 POKE36877,220
465 FORGU=15TO0STEP-1:POKE36878,GU
470 FORHJ=1TO150:NEXTHJ
480 NEXTGU
485 POKE7800,8:POKE7801,0:PV=0
490 POKE36876,0:POKE36877,0:POKE36876,220
495 VL=15:IFORDB=8152TO8184:POKEDB,3:POKEDB+1,4:POKEDB-1,0:POKE36878,VL:VL=VL-0,
500
75
496 IFVL=0:THENVL=15
497 FORT=1TO30:NEXTT
498 NEXTDB
499 POKEDB,0:POKEDB-1,0
500 POKE36876,0:POKE36878,0:POKE36869,240:POKE36879,27:PRINT"@"
505 PRINT"YOU WERE ELIMINATED":PRINT"WITH A SCORE OF "SC"."
510 PRINT"ANOTHER GAME (Y/N)"?
515 GETXX$:IFXX$=""THEN515
520 IFXX$="Y":THEN530
525 PRINT"END"
530 RESTORE:CLR:GOTD051
```

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# Programs for programs

**Tony Bridge looks at the growing range of utilities for the ZX Spectrum**

The vast majority of those people now buying home computers do so, apparently, to play games. Walk into the average software store, and the assistant will almost certainly ask you, "Which game would you like, Sir/Madam?"

But surely, sooner or later, the squeaks and explosions of the Invaders and Scramblers and hungry little Pacmen must pall for many people. It is then that the more serious programs come into their own.

The Sinclair Spectrum is particularly well-served in this area, as a well-trodden path for the Hobbyist has been forged from the ZX80, to the ZX81, and on to the Spectrum. The beauty of the Sinclair range is the excellent selection of software readily available for light relief, and the sheer — sorry about the jargon — "friendliness" of the machines.

So, in this review we shall take a look at some of the Utility programs — programs that make it easier for you to make your own programs work. In addition we'll look at Business Utilities — programs that make it easier for you to make your (small) business work.

Programming is a rather esoteric art, shrouded in mystery to the uninitiated. But it is rapidly becoming clearer to many people, as they take the plunge into the murky waters.

To the serious programmer, a Toolkit is a necessity. Workforce, run by Derek Tidman, has a number of programs which will be of interest. *Programmers Dream* (or *PD*, author Dr Robert Rayment), is loaded before work starts, and includes several useful features. *Renumber* is a powerful facility which renumbers your fledgling program from any start point, any step size, to any finish point. All *Gotos*, *Gosubs*, *Restores*, etc, which will be affected, are taken care of along with the renumbering.

*Block Move* is a similar facility, allowing the programmer to move a whole chunk of lines to another place within the listing, renumbering being handled along the way. *Erase* will do just that to any number of lines — but beware, *Gotos* and *Gosubs* are not handled by this command (but this shouldn't be a problem — the program would, on Run, go on to the next line after a *Goto* to a non-existent line).

*Change String* will change either every occurrence of a string, or selected occurrences. *Dump* (strange name) prints on the screen the variable names and values. Finally, but not leastly, the size of your program, together with the variables can be inspected. All this is pretty standard

fare for Toolkits, and contains nothing new, but Dr Rayment has written a very compact program (just 1450 bytes) which, along with the comprehensive documentation, is an absolute gem. The program is very easy to use — just Clear space above Ramtop, and then begin working on your own program. *PD* will be ready when needed.

Another compact little beauty from Dr Rayment and Workforce is the *Spectrum Disassembler*, which allows you to peek into the secrets of your machine code programs. The screen display contains, on the left, the address, and in the centre, the code of the bytes at that address. On the right is the mnemonic associated with the code. As you enter your machine code program, the *Disassembler* will translate the bytes into mnemonics for your inspection. The program is well-documented, and assumes the user to be completely familiar with machine-coding techniques.

## As an Introduction ■ is very useful

The final Utility from Workforce is *Display* a character generator, written by Gloster Software. Now, there are many CGs on the market, all pretty much the same, though each has its own attractive points — all Spectrum owners will already have a good one on the Horizon tape from Psion, and of course this one is free with the computer. Good value for money!

However, the tape from Gloster/Workforce is a different proposition entirely. As you will know, the Spectrum supports 21 User-Defined Graphics (UDGs) in addition to the 96 standard characters — *Display* will provide you with a massive 273 extra shapes (on the 16K machine) or 336 shapes on the 48K machine. To put it another way, the normal 21 UDGs allowed by the Spectrum may be held in sets of "pages" in memory and called up as needed — 16K will hold 13 pages and 48K will hold 16 pages. *Display* enables you to show all these pages on-screen in the same time.

A demo program is *Loaded* first. This consists of a title page, the text of which is set out in characters of 64 (to the line) width. Around the introductory text is arrayed a large number of UDGs, any of which may be set into animated motion at the touch of a key. You will see, for example, a rocket taking off, rifles shooting at a poor little bird, jugglers, munching Pacmen, dancers, spinning wheels and many more.

The main program follows on the tape. Once this is *Loaded*, a work space is

displayed along with a display "sheet".

Now is the time to *Load* into this space any characters you may have previously created, should you wish to work on them. Following the main program are several "pages" containing the characters from which the demo title page was built — you are advised to *Load* these and use them to gain insight into the workings of *Display*.

The Basic method to amend characters is: *Pick* from the display "sheet" or (if you are creating your own) *Fetch* a standard character from the Spectrum's keyboard, and move the character to the work space. Now the character may be *Turned* clockwise or anti-clockwise by 1/4 or 1/2 turns.

You may also *Invert* (or flip over) the character, *Reverse* back-to-front, *Expand* the character (so that any quarter will fill the whole square), and finally *Shift* the whole thing by one pixel at a time to the left, right, up or down. During this procedure, any of the pixels within the character square may be turned on or off. Finally, your amended or newly-created shape may be returned to the display sheet, ready for eventual *Saving* to tape.

By typing *Help*, a page of options is presented, and this along with the usual good Workforce documentation, ensures that the user is never left helpless. Advice on creating animated graphics is included, and in all, it is hard to imagine a more useful UDG-generating aid than this.

Another machine code programming aid has been published by Oxford Computer Publishing Ltd. Written by P O Ainsley, the *Machine Code Test Tool* comes nicely packaged in a shiny, sturdy box, slightly smaller in size than a paperback. The accompanying manual is described as a Tutorial in machine code, and fulfills this function quite well. A 32-page booklet cannot enter into quite as much detail as a full-blown book on the subject, but as an introduction ■ is very useful.

Your best course ■ to work through a book such as William Tang's *Spectrum* continued over the page





*Machine Language for the Absolute Beginner*, and return to the program with a better knowledge of the jargon and techniques of machine code programming. Write an exploratory program and use the Test Tool to run and debug your attempt. The contents of all the registers will be displayed for you to inspect and change as necessary.

As a bonus, a Character Generator (yes, another one!) is included on the reverse side of the cassette — it's fairly standard, with no surprises, but it's nice to get a little gift, isn't it?

*Spectrum Machine Language for the Absolute Beginner* is just one of many books now on the market (there'll be more!), all attempting to instruct the Spectrum user in the delights of machine coding. This book is one of the best I have seen on the subject — for once the title is on the nose! I can recommend this to anyone just getting interested.

The only quibble I have with the book is the amount of spelling mistakes — there is at least one per page, and the Great Spelling Mistake Hunt eventually becomes a major entertainment. Fortunately, this does not detract from the work as a whole, and only becomes a nuisance when a missing page throws the reader into momentary confusion.

A cassette is also available, containing some of the programs from the book.

Whilst on the subject of cassettes that come with books, let me mention once again Trevor Toms' *Spectrum Pocket Book*, which I spoke of briefly some weeks ago. Half of the book consists of the usual games listings, though for a change, these are original and actually quite good. They also, of course, contain a lot of useful routines for the reader's own games. And, incidentally, the line by line documentation of the program is exemplary.

The balance of the book is taken up with a very well-written introduction to machine code techniques.

A cassette is available for the games, and another for the machine code part of the book. Amongst other goodies on the second tape is a Screen Toolkit, which is a routine for scrolling up, down, left and right, as well as printing to any pixel.

Another system, recently released, is *Softsys*, from Softek, Tim Langdell's company. The full system consists of five programs — to take full advantage of them, they should be *Loaded* into memory together. However, they may be used individually.

Before work is begun, the heart of the system, *Masterkey*, should be *Loaded*. With the aid of this program, up to seven keys may be defined by the programmer. *Masterkey* comes with five keys predefined, which may be edited to suit the user's requirements. As they stand, they control, with one key-touch, entry of the Assembler which is another part of the system, entry of the Disassembler, and the operation of the Compiler.

Softek, confusingly, has another name for this program, *Softime*, which hints at its other facility, *clock*.

With *Masterkey* in memory, *Softkit 1*, a programming toolkit maybe *Loaded*. This is a fairly straightforward toolkit — like many others, it enables the use to *Renumber* (with all *Gotos*, *Gosubs* and so on), *Erase* — *Rem* statements (thus saving memory), and examine the length of program and variables at any time. The program will also change upper case characters into lower, and vice-versa.

Probably the most important and unusual feature for a program at this price and this computer, is the *Trace* facility. Run the program through, and you'll see the line number and statement currently being processed. Thus, if the program

hangs up, the bug can be traced very easily.

*Softkit 1*, like some of the other parts of *Softsys*, has been written by Andrew Glaisier, the author of several best-selling games for the Spectrum.

The next element of *Softsys* is *Softmon* (look, I didn't dream up these names!). The Disassembler/Monitor of the system. There are two versions, one for each of the memory sizes, but the facilities are the same in either case. Each command maybe accessed by one keystroke, thus, at one stroke relieving you of the need to buy *Masterkey*.

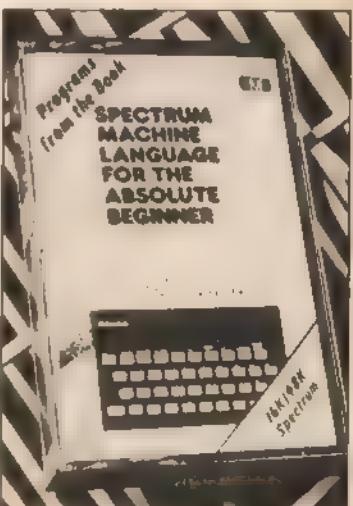
As will be the other parts of *Softsys*, the documentation is precise and clear, guiding the user effortlessly through the highways and byways of the Utility. Twenty-five functions in all are available, including, in the Monitor section, *Erasing* or *Inserting* bytes in memory, decimal to Hex conversion, and vice-versa, *Moving* areas of memory, finding a series of bytes, and so on.

Probably the most intriguing part of the whole *Softsys* package, however, and one that Softek obviously regard as the flagship of the system, is the Compiler, or *Super C*, as Softek couldn't refrain from calling it!

### A number of things the Super C can't handle

*Super C* comes well-packaged in a large box that opens like a book to reveal the cassette nestled inside along with a 22-page instruction manual. The cover artwork shows, for some strange reason, a futuristic starship pilot fixing the viewer with an icy stare. Reflected in his visor is a — well, probably a Betelgeusian Battlecruiser! And just when you thought it was safe to go back to the Spectrum! Eye-catching, however, which is the object of the exercise.

The Compiler converts, more or less



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instantly, your Basic program into machine code, thus endowing the program with all the benefits of machine code. Three small programs are included in the package, which demonstrate the point admirably. A screen printing routine is followed by a count from 1 to 1,000, and in both cases, the compiled program is orders of magnitude faster.

The most impressive demonstration is the third, a very simple *Invaders* program. In Basic it is very slow, and you wouldn't want to play it for more than a few seconds. When compiled, the program becomes very much faster, and the game is at least bearable for a couple of minutes.

Down to the operation now — and it's all clearly explained in the manual. If *Masterkey* has been *Loaded*, a key can be defined to handle the compiling command, but that's very quick to type anyway. Just Load your Basic program, and then simply key *Randomise Usr 49152* — a fraction of a second later, the program is in machine code!

Sounds simple, doesn't it? Well, it is, but don't get the idea that you can write anything in Basic and have it compiled for you. There are a number of things that *Super C* will not handle, and which necessitate extra thought when writing your original program.

First, variables can only be upper case (capital) characters, and you are only allowed to define 25 of them — A to Z. A second example is *Gotos*, *Gosubs* and *Returns*. These must all refer to an existing line, no more jumping to a vague line number and letting the computer find the next relevant line. *Super C* will not, moreover, recognise a calculated line number (so you cannot say *Goto 20+score*).

### A stand that is morally indefensible

A final example here, although there are several more in the manual, is the restriction on local colour commands. You'll be used in Sinclair Basic, putting *Over*, *Invert*, *Ink*, *Paper*, and so on within *Print* statements — these will not affect the rest of the screen or program. These will not be compiled by *Super C*. You will have to set the parameters globally, and then reset after the *Print* statement.

However, the most serious drawback in *Super C*'s facilities is that it will not compile statements involving fixed-point arithmetic, and will not allow string-handling statements. An enhancement package will, says Softek, be available soon to enable the programmer to use these facilities in his Basic program.

I don't know if Softek intends to give the package to existing customers or will charge extra for them, but I think a program calling itself a Compiler should certainly include these facilities.

The total Sofsys package can be recommended, and the Compiler, in particu-



lar, though expensive at £15, is — with the caveat of the lack of some important facilities — worth every penny.

One final doubt nags me, however, and that is about the copyright notice at the beginning of *Super C*'s manual. I've deliberately left this point out of my appraisal until now — it will only affect you if you intend to market your compiled program. Softek is very concerned that, as such programs must contain some of *Super C*'s routines, the company must ask

you for a royalty. I think this stand is, morally at least, indefensible. There are many compilers in use much higher up the computing scale, at the minicomputer and mainframe level. Royalties are not sought by the original manufacturers of these programs, unless the actual compiler itself is passed on to a third party as part of a total package.

Legally, of course, Softek are entitled to ask whatever they desire — and Sofsys remains as a most important suite of programs for the programmer. ■

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Melbourne House Globe Cottage Station Road Cheddington Leighton Buzzard Beds	<i>Spectrum Machine Language for the Absolute Beginner</i>	£6.95
Phipps Associates 99 East Street Epsom Surrey KT17 1EA	<i>Spectrum Pocket</i>	£6.50
Softek 329 Croxton Road London	<i>Masterkey</i> <i>Softek</i> <i>Softron</i> <i>Super C</i>	£7.99 £7.99 £7.99 £14.95

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## **PROGRAMMING**

## **Clearly labelled!**

**R Luxton** explains how to make your own labels on the 16K ZX81

**L**abel Maker is a routine for the 16K ZX81 to print your own personal label at the head of any program. It can take the form of a "copyright" mark, a special

instructions panel, a fancy nameplate, or whatever you want. It is designed to be Poked above Ramtop, so that it can be quickly added to any existing program.

**Fig 1 Label Maker**

```

1 REM
2
30 REM
40 REM INPUT TITLES
50 REM
60 PRINT "ENTER PROGRAM TITLE"
70 INPUT A$
80 IF LEN A$>25 THEN GOTO 70
90 PRINT
100 PRINT "ENTER COPYRIGHT LINE"
110 INPUT B$
120 IF LEN B$>25 THEN GOTO 110
130 REM
140 REM SET-UP GRAPHICS
150 REM
160 LET R=137
170 FOR I=16513 TO 16535
180 IF I=16540 THEN LET R=136
190 IF I=16564 THEN LET R=136
200 POKE I,R
210 NEXT I
220 LET R=133
230 FOR I=16513 TO 16535 STEP 3
240 POKE I,R
250 NEXT I
260 LET A$=6
270 FOR I=16539 TO 16535 STEP 3
280 POKE I,A
290 .NEXT I
300 LET R=6
310 FOR I=16540 TO 16535
320 IF I=16545 THEN LET I=16572
330 IF I=16577 THEN LET I=16564
340 POKE I,A
350 NEXT I
360 REM
370 REM POKE IN TITLES
380 REM
390 LET C=1
400 LET Z=INT ((26-LEN A$)/2)
410 FOR I=16546+Z TO 16546+Z+LE
N A$-1
420 POKE I,CODE A$(C)
430 LET C=C+1
440 IF C>LEN A$ THEN GOTO 460
450 NEXT I
460 LET C=1
470 LET Z=INT ((26-LEN B$)/2)
480 FOR I=16578+Z TO 16578+Z+LE
N B$-1
490 POKE I,CODE B$(C)
500 LET C=C+1
510 IF C>LEN B$ THEN GOTO 530
520 NEXT I
530 CLS
540 GOTO 560
550 STOP
560 PRINT "IF LINE 1 IS OK, //ENTER GOTO 560 AND NEWLINE. //IF NOT, //ENTER GOTO 26 AND TRY AGAIN."
570 PRINT
580 PRINT
590 PRINT
590 LIST
600 LET A=16513
610 FOR I=32646 TO 32767
620 POKE I,PEEK A
630 LET A=A+1
640 NEXT I
650 REM
660 REM REMOVE WHOLE PROGRAM
670 REM
680 REM
690 REM SAVE "LABEL MAKE"
700 REM

```

ram's title, and then the copyright line, after which the screen will go blank for a few seconds, and will then *List* showing your label in 1 *Rem*. If the label is correct, just enter *Goto 600* and *Newline*. If not, then enter *Goto 20* and *Newline*, and enter it again. When the label is right, enter *Goto 600* and *Newline*, and the computer will *Poke* your label above Ramtop.

First, type in the listing in Fig 1 starting with *T Rem* and exactly 122 full stops [enter as a direct command, "Print(Peek(16511)-2) to check that you have the right number] and then Save the program before Running. Next, clear the ZX81 by switching off for three seconds or so, and then switch on again. Enter as direct commands, "Poke 16388,133" and "Poke 16389,127" and "New", then Load and Run the routine.

You will be asked  
to enter your prog-

10

1 OEM

```
9800 LET A=32645
9810 FOR I=16513 TO 16535
9820 POKE I,PEEK R
9830 LET A=A+1
9840 NEXT I
```

四

```
8999 DIM A$(123)
9025 LET A$(I-16512) =CHR$  
PEEK A
```

### **Examples of labels**

ZX81 LABEL MAKER  
© 1983 B.G. LUXTON

DO NOT ENTER \*RUN\*  
TO START ENTER \*GOTO 10\*

# The Pit – part two

**Paul Sellin presents part 2 of The Pit — a text adventure for the 16K Spectrum**

This week, having initialised the arrays and variables ■ start the game, we shall look at one of the most important elements in an adventure game — the monster.

Lines 3015 to 3075 contain the monster routine, with the data being stored in line 3100. The routine is really very simple: once the monster has been 'chosen' from the data, either it attacks you (line 3025), you attack it (lines 3030 to 3035) or you retreat.

If you are still 'alive' after the monster has attacked you, then the program moves on to the 'attacking the monster' sequence. If the monster survives, which is checked at the end of line 3035, then the

program jumps back to line 3025 and puts you under attack again!

On entering the monster routine, the computer must randomly select which monster to present. This occurs in line 3015 — by looping a random number of times, each time reading a set of data, the current data after the last loop becomes the chosen monster.

Line 3100 contains five pieces of data for each monster: first its name, which is a string and is assigned ■ *p\$*, then four variables representing in turn its strength, psi power, dexterity and intelligence, each in the range 0 to 20. These are assigned to the four variables *st*, *ps*, *de* and *in*. Notice how the monster's variables differ from the

player's variables of *s*, *p*, *d* and *i*.

If you survive the monster's attack, then you have the chance to fight back. Depending on your dexterity, the computer allows you a certain amount of time in which to attack — if the time runs out, then the monster attacks again.

The computer allows you to attack in one of three ways: either by casting a spell (key *s*), by giving it a thought problem (key *t*), or by just attacking normally (any other key except *r*). Pressing the *r* key allows you to retreat.

The spell routine is in lines 3050 and 3055. It prints up ■ suitably fiendish spell and then calculates its effects by comparing the variables *p* and *ps*. If the monster dies, then the whole monster routine is exited via line 3040; if not, then the monster attacks again with the program jumping to line 3025.

The 'thought' routine works in a similar way in lines 3060 to 3070. The computer

```

2530 DATA "a potion of sight","a
hocking gas!!!","Flash!! An expt
osion!","an old skeleton","a set
of bonuses!","nothing","a set o
f bonuses!","nothing"
2540 IF X$(1 TO 2) = "F1" THEN LET
si=0: GO TO 8500
2545 IF X$(1 TO 2) = "CH" THEN PRIN
T "It weakens you...": LET d=INT
(d-RND*8): LET i=INT (1-RND*5):
LET s=INT (s-RND*5): GO TO 8000
2550 IF X$(1 TO 3) = "a P" THEN PRI
NT "You boost your powers of si
ght...": LET si=1: GO TO 1000
2560 GO TO 1000
2705 IF NOT si OR NOT i THEN GO
TO 8500
2710 IF y<2 OR x<2 OR y>9 OR x>1
9 THEN PRINT "No Flares here,
dear creature...": BEEP .2,-12
: GO TO 1000
2715 CLS : PRINT "Here goes wi
th one precious flare...":
FOR f=y-1 TO y+1: PRINT TAB 12;
PAPER 2;"": FOR e=x-1 TO x+1:
PRINT INK 7; PAPER 2;a$(z,f,e);"
": NEXT e: PRINT "": NEXT f: P
RINT AT 5,15;"": INK 0: LET fl=
f-1: PRINT "": GO TO 1000
2720 GO TO 1000
2800 PRINT "Oh dear!!! You've f
ound a Time Warp...": LET z=1+IN
T (RND*3): LET x=1+INT (RND*19):
LET y=1+INT (RND*9): FOR h=38 T
O -12 STEP -1: BEEP .05,h: NEXT
h: PRINT "You are now at Level
"z,"At position "x,y": GO
TO 8000
2900 LET e=1+INT (RND*9): LET fl
=f+l+e: PRINT "You found ",e," fl
ares.": LET a$(z,y,x)="": GO TO
8000
3015 RESTORE 3100: FOR f=1 TO IN
T (1.5+RND*7): READ ps,st,ps,de,
in:,NEXT f: PRINT "You have foun
d ",ps," Status Report: "Stre
ngth",st,"Psi Power",ps,"Dexteri
ty",de,"Intelligence",in: FOR f=
1 TO 300: NEXT f: IF d-de>0 THEN
IF 5+RND*2>de*2 THEN GO TO 3030

```

generates a random multiplication sum in line 3065 — the accuracy of the monster's 'answer' is dependent on *m*, its intelligence, plus a random factor.

There are a few little extras, such as you not being allowed to 'think' if *i* is less than 10, whereupon you will immediately be attacked again. Also, a stupid monster, where *m* equals zero, will ignore your sums and proceed to attack regardless.

'Retreating' is contained in line 3033 which just prints up a suitable message and exits the monster routine to line 8000. But, your strength is reduced significantly if you retreat from a weak monster.

Normal attacking revolves around line 3035 which calculates the monster's damage and subtracts it from its strength. If *s* is still greater than zero, then the monster attacks you again with the program jumping back to line 3025.

On killing the monster and reaching line 3040, your psi power is increased according to that of the monster. The *m* character

in the main array is replaced by a space, ensuring that the monster really is dead. If you kill the Warlord, which is the strongest monster of them all, then you could pick up treasure if the program jumps to the 'treasure' routine in line 2000.

On leaving the monster routine in line 3045, the program jumps to line 8000. This is just one big multi-statement line, which prints out all the variables and strings of the player. Poking 23692 just lets the screen scroll automatically. This routine then jumps back to the main loop at line 1000.

A couple of other useful blocks of program are those which give the player his 'eyes'. These are the 'flare' routine (lines 2700 to 2715) and the 'map' routine (lines 9201 and 9220). Both are accessed directly during the game by pressing keys *f* or *m* respectively (lines 1003 and 1004). If you are blind and *s* equals zero, then both routines will jump to line 8500 and then back to the main loop.

The 'flare' routine prints out the eight positions all round your current position and draws a box around them, at the same time taking one off the *f* variable, and then returns to the main loop at line 1000. But, note that the flares will not work on the edges of the array (line 2710 — why do you think that is necessary?).

Finally, the map routine in line 9220 prints out horizontally the 10 rows of that 'page' of the array and marks your current position. Note the double *Pause* statements before jumping to the Status Report; this is to get round the Spectrum Rom bug which sometimes ignores a single *Pause* statement.

Next week we shall look at the final part of *The Pit*. ■

● *The Pit* has been split into three parts. Enter part 2 of the program now and Save it on tape. Part 3 will be published next week. You will need to enter all three parts of the program before running it.

```

3025 BEEP .1,0: PRINT "The mon-
ster attacks...": PAUSE 100: LET
h=ABS (INT ((1+ST-RND)-(1-RND/2)/
2)): PRINT "You take \"hi\" damage
e.": LET S=S-h: PRINT "Your stre-
ngth: ";S: PAUSE 30: IF S<=0 THEN
GO TO 9000
3030 BEEP .1,24: PRINT FLASH 1,
"***Strike Now***": PAUSE 1: PAU-
SE d+S: IF INKEY$="" THEN PRINT
"Too late...": GO TO 3025
3031 IF INKEY$="s" THEN GO TO 30
50
3032 IF INKEY$="t" THEN GO TO 30
60
3033 IF INKEY$="r" THEN PRINT " "
Cowardly Creature!!: LET S=S-IN
T ((21-ST)/4): GO TO 8000
3035 PRINT "You attack...": PAU-
SE 50: LET h=ABS (INT ((1+RND*2-
1)-RND)/2)): PRINT "Monster ta-
kes \"hi\" damage.": LET ST=ST-h:
PRINT "Its strength: ";ST: IF ST
>0 THEN GO TO 3025
3040 PRINT "You have killed the
monster.": LET P=P+INT (PS/4): L
ET ST=Y,X): IF P$="the War-
lord" THEN IF RND*10>6 THEN PRIN-
T "You're lucky, the monster was
carrying treasure...": GO TO
2010
3045 GO TO 8000
3050 PRINT " INVERSE 1; "Rest th-
y time, thou serocious and accursed
creature". FOR E=1 TO 50: NEXT
E: PRINT "The monster staggers.
.": PAUSE 1: PAUSE 100: IF RND*+
P*5>PS#2 THEN PRINT "...and dies
.": GO TO 3040
3055 PRINT "...and recovers.": L
ET P=P-PS/4: GO TO 3025

```

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# All keyed up!

**Peter Chase** explains how to use machine code to enhance the Dragon's keyboard

This article is aimed both at readers who have assembler packages and may be wondering what to do next, and for those who would like to extend the capabilities of the Dragon by using machine code routines in their Basic programs. The following routines are designed to improve keyboard responses and to extend colour and text usage.

The `Inkey$` function will only tell that one key is being pressed. If more than one key is pressed then neither key will register. Similarly, if one key is already being held down, a second one will not register.

Using machine code, it is possible to check if any key is being held down, regardless of how many other keys are being pressed. This has very many applications. For instance, it allows diagonal movements by pressing two arrow keys or, in action games, one key can be used as an 'accelerator' and another for 'steering' etc.

To find out if a key is being pressed, it is necessary to place its column number into location `&HFF02` and then to check the appropriate bits in location `&HFF00`. Listing 1 `@KEY` shows how this can be programmed in assembly language.

The program works by storing the `A` register in the column select register at `&HFF02` and then comparing the `B` register with the contents of the row input register `&HFF00`. Table 1 shows what values to put in the `A` and `B` registers to check any key. If the selected key is depressed, then the `Z` flag in `CCR` will be set, allowing the use of `BNE` and `BZ` jumps.

For those without assemblers, lines 15–60 of Listing 2 show how the routine can be entered into Basic programs by Poking the hex codes into locations starting with `&H7001` (the additional codes allow the row and column numbers to be Poked into locations `&H7002` and `&H7003`). The routine is then accessed with `Exec &H7001`.

Listing 2 itself is a program showing one use of the `@KEY` routine. It allows hi-res drawing in eight directions with the four arrow keys. Pressing the arrow keys alone gives movement, while depression of shift and arrow keys together allows drawing on the screen. You can produce very intricate 3-dimensional drawing with this program which can then be saved as screens on cassette.

One of the major drawbacks of the Dragon 32 is that it is not possible to have text and hi-res graphics together using Basic alone. Also, the number of colours in hi-res modes is very limited. However, the video chip used in the Dragon is capable of producing many more modes. One of the

most useful of these is alpha semographics mode 24, which allows usual text, 64 x 192 hi-res graphics and nine colours all to be used at once. In a previous issue of *Popular Computing Weekly* it was explained how to get into mode 24 from Basic using `Poke &HFFC5,0:Poke &HFFC3,0:Poke &HFFC0,0`.

For those with assemblers, Listing 3 contains five routines for printing text in mode 24. `@SEL24` selects mode 24, while `@CLS24` fills the mode 24 screen with the character stored in location `&HFF0`. `@PT2` prints the character stored in the location `&HFF2` at co-ordinates stored in `&HFF0` and `&HFF1`.

`@SCRL24` scrolls the screen up one line. `@MSG24` prints a message to the screen from the address pointed to by the `Y` register. To use the latter routine, both `@PT2` and `@SCRL24` must be in memory as well.

If you want to use these routines from Basic, then the first four can be entered as shown in lines 15–60 of Listing 2 by Poking the hex codes (column two of Listing 3) into addresses starting `&H7FF0` and then Exec the address of the routine. To use `@MSG24` from Basic, it is first necessary to define `Def Usr0 = &H7080` at the start of your program and then use `N = Usr0(Varptr(A$))` where `A$` is the

string you wish to print.

The real advantage of mode 24 is the mixing of text with 9-colour hi-res graphics. The display memory in mode 24 goes from 1024 to 7168 (decimal). Each of the 192 rows contains 32 bytes and each byte is organised as in Figure 1.

		Set Colours				
Bit 7	(0-7)	Bit 0				
		L1	L2	L1	L2	
1=graphics						1=colour
0=text						0=black
						Bit
		6	5	4		
Colour						
Green	0	0	0	0		
Yellow	1	0	0	1		
Blue	2	0	1	0		
Red	3	0	1	1		
Bull	4	1	0	0		
Cyan	5	1	0	0		
Magenta	6	1	1	0		
Orange	7	1	1	1		

For example, to set the top left pixel yellow, then the binary for the appropriate byte is 10011010 which equals 154 in decimal. So in Basic, the command would be `Poke 1024,154`. The equivalent assembly instruction is `LDA #154 Sta 1024`.

Listing 4 is an assembly program to show the mode 24 9-colour hi-res graphics. Listing 5 is a version of this for use without an assembler and shows the mixing of text with hi-res graphics.

Table 1

	FE	FD	FB	F7	EF	DF	BF
FE	0	8	@	H	P	X	ENT
FD	1	9	A	I	Q	Y	CLR
FB	2	:	B	J	R	Z	BRK
F7	3	;	C	K	S	UP	
EF	4	,	D	L	T	DN	
DF	5	-	E	M	U	RT	
BF	6	.	F	N	V	LT	
7F	7	/	G	O	W	SPCSFT	

Put the number across the top into `A` or, if using BASIC poke it into `&H7002`. Put the number down the side into `B` or `POKE` into `&H7003`.

continued on page 25



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## Listing ONE-Keyboard Controller

TIME	20	PRI
7001	847F	49
7002	7FFF82	48
7003	F57E80	48
7004	C47F	48
7005	3464	48
7006	A15B	48
7007	33	48
7008	18	50

### Listing Three-Routines for MODE 24

## LISTING TWO-DRAWING WITH @KEY

```

15 CLEAR#8000,40000
16 RESTORE
20 :=1000000
30 (=+)
40 REND ANG
50 IF ANG<? THEN JMB ELSE POKE 2,WAL("BH"+ANG)1001D8
55 DATA CL,0B,00,27,7B,FF,F2,FF,02,F6,FF,0B,34,B4,A5,6B,
     26,B2,23,FF,3B,E
100 PEEK(4,1)NFCLS(SCREEN1,1
120 ?=0?255?Y=0?C=0
130 DING(A,2)
150 PUT(X-3,Y-2)-(X3,Y2),0,NOT PUT(X-3,Y-2)-(X3,Y2),C,NOT
160 POKE X-3,Y-2,NOT PUT(X-3,Y-2)-(X3,Y2),NFC
170 EXEC#2001+1PEEK(X-3,Y-2)?1001 CELSE C=0
180 POKE(X-3,Y-2),NFC
190 POKE(X-3,Y-2),NOT EXEC#2001+(PEEK(X-3,Y-2)?1001 T2THEN#T-1
200 HMEC#2001+1PEEK(X-3,Y-2)?1001 T1THEN#T-1 AND T2THEN#T-1
210 DING(B,2)
220 POKE(X-3,Y-2),NOT EXEC#2001+(PEEK(X-3,Y-2)?1001 T2THEN#T-1
230 POKE(X-3,Y-2),NOT EXEC#2001+1PEEK(X-3,Y-2)?1001 T1THEN#T-1
240 POKE(Y-1,X-1)00103B

```

### **Listing Four—World's Wonderful Displays**

## Listing Five-Text n' Hires

# Cause and effect . . .

**Calvin Woodings** explains how to use the analysis of variance technique

In any set of experimental results, the variations which appear will have arisen from a number of different sources. At the very least, there will be the variation caused by the effects of the factor being investigated, along with the variation caused by the errors in measuring these effects.

More complex experiments can involve several factors being tried at several levels — unwanted variations can arise from the method of measurement, the operator carrying out the tests, the day on which the test was done, and even such apparently unlikely effects as the weather. Analysis of Variance (Anova) is an extremely powerful statistical tool which enables you to quantify such variations, so that you can decide which of the deliberately created effects are important compared with the unwanted error or interaction effects.

Unfortunately, many different types of Anova are required to cope with the many different types of experiment, and a general purpose program to suit all options is way beyond the scope of this article. So, in order to give the reader a taste of the possibilities, this program deals with experiments involving between two and six factors, each at two levels, and with all possible interactions of the factors being studied. Such experiments are known as  $2^n$  Factorials, where  $n$  is the number of factors and 2 is the number of levels of each factor (this notation also tells you how many trials are involved overall; eg, three factors at two levels means  $2^3$  or 8 separate trials). Such an experiment is frequently used at the outset of an investigation, when you are interested in looking at several different effects to decide which ones merit a more detailed study.

Suppose you are interested in improving the fuel consumption of your car. Suppose also you feel that the grade of fuel, the tyre pressures, and the maximum speed used are going to be important. You decide to measure the consumption over a standard route with two star versus four star fuel, 20 psi versus 30 psi in the tyres, and 50 versus 70 mph as speed limits. The complete factorial experiment will involve 8 runs as shown in Figure 1.

Each run involves a different combination of factors and the table illustrates these runs arranged in the 'standard order' to suit our method of analysis (devised originally by F Yates in 1937). Notice how the levels of the factors alternate going down the columns. The order is LoHi for factor 1, LoLoHiHi for factor 2, and LoLoHiHiHi for factor 3.

While it is important to arrange the results in this way prior to analysis, in this sort of trial it is also important not to carry out the runs in the same order. In fact, the run order should be randomised so that any unwanted effects (eg, the weather) are not easily confused with the factors being investigated.

Let's assume you carry out the trial and obtain the results shown in the last column of Figure 1. You run the program typing in 3 for the number of factors, fuel, tyres, and speed for the factor names, and MPG for the results name — then you type in the results in the order requested. You then have an opportunity to edit the data.

The next prompt, asking for an estimate of the error variance from other similar trials needs some explanation. In Anova, the significance of effects and their interactions is estimated by dividing the variance (or mean square) due to the effect under

review by the variance due to experimental error. This error variance may be available from the analysis of other trials. Such 'external' estimates of error are to be preferred if available, but if not the full factorial experiment enables you to get an error estimate by treating the more unlikely interactions as errors.

The ratio of effect to error variance is known as the variance ratio or F-ratio. Statistics text books generally contain tables of F-ratio which enable the calculation of the significance of the effects being studied.

In this case, we have no external error estimate so answer No to the prompt. The first *Main Effects* table appears (Fig 2) and informs you that increasing Fuel (ie, changing from 2 star to 4 star) adds 1.13 miles to your gallon, while increasing Tyres (ie tyre pressure) adds 3.63 mpg. Increasing speed reduces mpg by 2.82. The error mean square shows 0 because you did not have one from other trials — you are advised to be prepared to note the numbers of those interactions which you are willing to sacrifice in the interests of significance testing.

Continuing to the next screenful, the 1st order interactions (ie, the interactions of all possible pairs of main effects) appear (Fig 2). In this example they are all relatively unimportant as indicated by the small *Mean sq* figure. Similarly, the second order interaction (only one possible interaction of groups of three effects in this case) is unlikely to be of any great experimental interest. Note that the numbers of the interactions are the numbers of the 'standard order' used for data entry, and not the order in which they appear on the screen.

Now that you have decided that none of the interactions are of any value, you can pool their variances to estimate the error variance. Enter 3, 5, 6 and 7 followed by 0 to end and say Y to look at the tables again. This time the F-ratios for each effect are given, along with the value of F-ratio corresponding to the 90 percent confidence level (Fig 3). You can now see that

STANDARD ORDER	FUEL GRADE	TYRE PRESS	SPEED	RESULTS
	level	level	level	level
1	lo	2	lo	20
2	hi	4	lo	20
3	lo	2	hi	30
4	hi	4	hi	30
5	lo	2	lo	20
6	hi	4	lo	20
7	lo	2	hi	30
8	hi	4	hi	30

Figure 1. Standard order for results in  $2^3$  Factorial

the tyre pressure effect is not only the biggest factor in improving fuel consumption, but also the effect of highest significance. Speed is the next most important effect, and is highly significant in reducing the miles per gallon figure. Fuel is less important.

#### Program notes

Procdataload and Procentry control data

input, the standard order being computed by lines 610 to 650. Procanalysis calculates the effects of the changes and the corresponding mean squares using Yates' method. Note that for 2 level factorials the effect and mean square are exactly equivalent and that the mean square is also the sum of squares (mean squares = sum of squares/dof, and dof or degrees of freedom are 1 in a 2 level experiment). The

arrays required for the standard order labels and Yates' analysis of a six factor experiment use up nearly all the available memory on the Model B.

Procprintout, along with Procheading, prints out the results of the analysis for the main effects, and Procints handles the interaction pages.

Proerror calls for interactions which can be used to estimate error variance. Given the standard order numbers of the unwanted interactions, it simply averages their mean squares. The degrees of freedom are used in three different ways for calculating error variance (dof), as a flag to check if another interaction has been added to the estimate (dof), and as an approximation with which to enter the F-ratio table (d).

Procext deals with an external estimate of error variance. The data in the end of the program consists of the probability points of the F distribution, for cases when the experiment has only 1 degree of freedom per effect, and a 90 percent confidence level is required. The F-ratios correspond to increasing degrees of freedom in the error variance estimate (up to 27 dots) followed by one F-ratio for 28 to 59 dots (ie. 2.85), and another for more than 59 dots (ie. 2.75). ■

#### MAIN EFFECTS

No. Change	Effect on M.P.G.	Mean Sq
1 Increasing FUEL	1.13	2.53
2 Increasing TYRES	3.63	26.3
4 Increasing SPEED	-2.92	17.1

Error Mean Square = 0

From 0 Degrees of Freedom

Note No's of interactions you wish to use as estimate of error variance from the following tables.

Press any key to continue

#### 1st ORDER INTERACTIONS

No. Change	Effect on M.P.G.	Mean Sq
3 FUEL TYRES	0.275	0.151
3 FUEL SPEED	0.225	0.101
6 TYRES SPEED	0.125	3.12E-2

Press any key to continue

#### 2nd ORDER INTERACTIONS

No. Change	Effect on M.P.G.	Mean Sq
7 FUEL TYRES SPEED	0.475	0.451

Enter No's of interactions you want to use as estimate of the error variance.  
('0' to finish)

#### MAIN EFFECTS

No. Change	Effect on M.P.G.	F-ratio
1 Increasing FUEL	1.13	13.8
2 Increasing TYRES	3.63	143
4 Increasing SPEED	-2.92	93.1

Error Mean Square = 0.184  
From 4 Degrees of Freedom

If F-ratio>4.54 then effect of change is significant at >90% level.

If F-ratio=0 then effect has been chosen to estimate error.

Figure 3. Print out on second pass

Figure 2. Print out on first pass

```

10 REM STATISTICS/ANALYSIS OF VARIANCE
20 REM FOR 2^n FACTORIAL EXPTS.
30 REM (C) C.R.WOODINGS/MAY 1983
40 REM FOR BBC MICRO MODEL B
50
60 MODE7:PROCtitle
70 CLS:PRINTTAB(0,12)"Enter number of
factors (min=2,max=6) "
80 f=VALFNinput(1,49,55):r=2^f
90 DIM F(f),data(f,r),name(f),efec(r),
mnsqr(r),lbls(r),intg(r)
100 fctr=f:ralt=r:ext=0
110 PROCdataload
120 REPEAT:doF=0:erv=0
130 CLS:IF FNyes_no(10,12,"Edit the data")>
PROCPreview
140 CLS:PRINTTAB(15,12)"COMPUTING"
150 PROCanalysis
150 CLS:IF FNyes_no(1,11,"Do you have a good
estimate of error variance from other
trials") THEN PROCext:GOTO180
160 P=0:REPEAT:PROCprintout(P):PROCCerror
(P):P=P+1
170 UNTIL NOT FNyes_no(3,VPOS+1,
"See the tables again")
180 UNTIL NOT FNyes_no(10,VPOS+1,
"Another run")
190 MODE7:PROCDouble_height(11,"BYE",132)
END
200
210 DEFPROCtitle
220 " PROCDouble_height(B,"STATISTICS",132)
230 " PROCDouble_height(12,"Analysis of 2^n
" Factorial Experiment",131)
240 PROCContinue:ENDPROC
250
260 DEFPROCdouble_height(column,words$,colour)
270 column=INT((40-LEN(words$))/2)-2
280 FOR I=row TO row+1:PRINTTAB(column,I),
CHR#141:CHR$colour:words$#
290 NEXT:ENDPROC
300
310 DEFFNyes_no(x,y,AB)
320 LOCAL ans:PRINTTAB(x,y):AB;" (Y/N) ? "
330 REPEAT:ans=(GET AND 0DF):UNTIL ans&49
340 OR ans&4E:PRINTCHR$ans
340 <(CHR$ans="Y")
350
360 DEFPROCcontinue
370 PRINTTAB(7,23)"Press any key to
continue ",(REPENTERUNTILGET:ENDPROC
380
390 DEFVNinput(len,loASC,hiASC)
400 LOCAL K%,Z%:K%=0:In$=""(PRINT STRING$(
len,":"):STRING$(len+1,CHR#8)," ")
410 .#FX15,1
420 REPEAT:Z%>GET
420 IF Z%>127 AND K%>0 THEN K%=K%-1:In$=
LEFT$CIn$,K%):VDUZ%,46,B:GOTD450
430 IF Z%>1oASC AND K%<hiASC AND Z%<hiASC
THEN K%=K%+1:In$=In$+CHR#Z%:VDUZ%,C0
TO450
440 IF NOT(Z%>13 AND K%>0) YDU7
450 UNTIL Z%>13 AND K%>0
460 =In$
470
480 DEFPROCPreview
490 FOR M%=0 TO rslt-1
500 PROCentry("EDITING")
510 PRINT\data(0,M%):IF FNyes_no(8,15,
"Change entry") THEN PRINTTAB(8,17)"NE
W RESULT = ":"data(0,M%)=EVRLFNinput
(<10,40,58)
520 NEXT:ENDPROC
530
540 DEFPROCdataload
550 FOR N=1 TO fctr:CLS
560 PRINTTAB(3,12)"Enter a name for factor
":(NJ) "
570 name(N)=FNinput(3,32,127):NEXT
580 CLS:PRINTTAB(3,12)"Enter a name for
results."
590 rsult=FNinput(6,32,127):CLS:PRINTTAB
(15,12)"COMPUTING"
600 REM rest of Procedure Gets results in
standard order for Yates Method
X=1:R=0:REPEAT
FOR N=1 TO rsult:X
FOR M%=1 TO X
640 IF M%DIV2<N%/2 THEN Fc(R)=Fc(R)+"
Lo" ELSE Fc(R)=Fc(R)+" Hi"
650 NEXT:NEXT:X=2*X:R=R+1:UNTIL R=fctr
FOR N=0 TO rslt-1
PROCentry("LOADING")
data(0,N%)=EVRLFNinput(10,40,58)
NEXT:ENDPROC
700
710 DEFPROCentry(B$)
720 CLS:PRINTTAB(12,1)"DATA "):B$:PRINTTAB
(0,11-fctr):
730 FOR X%=-0 TO fctr-1:level=MID$(Fc(X%),
N%3+1,3)
740 PRINTTAB(10):name(X%+1),TAB(17)"at"
level;" level"
750 IF B$="EDITING" THEN 780
760 IF level=" Hi" THEN level="H" ELSE
level="L"
770 lb10(N%)=lb10(N%)+level$B
780 NEXT:PRINT'TAB(10)"Result = ":"ENDPROC
790
800 DEFPROCanalysis total=0
810 FOR M%=0 TO fctr-1
820 FOR N%=-0 TO rslt-1 STEP 2
data(M%+1,N%/2)=data(M%,N%)+data
(M%,N%+1)
840 data(M%+1,N%/2+rslt/2)=data(M%,N%+1)
-data(M%,N%)
850 NEXT:NEXT
860 FOR N%=-0 TO rslt-1
efec(N%)=data(M%,N%)/2^(M%-1)
880 mnsqr(N%)=data(M%,N%)^2/rslt
890 NEXT:mnsqr(0)=0:ENDPROC
900
910 DEFPROCPrintout(Pass) @%=&L300
920 CLS:PRINT'PROCheading("MAIN EFFECTS")
930 N=1:FOR M=1 TO fctr
940 PRINT:TAB(3);"(Increasing ")name(M),
TAB(23):efec(M),TAB(32)
950 IF Pass=0 THEN PRINT/mnsqr(N)/erv
960 N=N*2:NEXT:PRINT"/Error Mean Square =
":erv;"From ";dof;"Degrees of Freedom"
970 IF Pass THEN PRINT" If F-ratio>";f_ratio
;" then effect of change is sig
nificant at >90% level.";" If F-ratio=0
then effect has been chosen to estimate
error."
980 IF ext OR Pass THEN 1000
990 PRINT"Note No's of interactions you
wish to"|"use as estimate of error v
ariance"|"from the following tables."
FOR N=2 TO fctr:PROCContinue
PROCint(H-1,Pass)
NEXT:@%=&L300:ENDPROC
1040 DEFPROCints(order,Pass) YDU26:CLS
1050 IF order=1 THEN S$="st" ELSE IF order=2
THEN S$="nd" ELSE IF order=3 THE
N S$="rd" ELSE S$="th"

```

```

1060 PRINT",order:$";PROheading(" ORDER
INTERACTIONS")
1070 FOR N% = 3 TO rint:int$(N%)="";flag=-1
1080 FOR X% = 1 TO Fctr
1090 IF MID$(L61$(N%),X%,1)="H" THEN int$(
N%)=int$(N%)+" "+name$(X%);flag=flag+
9+1
1100 NEXT
1110 IF flag=order THEN PRINT:N%:TAB(2),
int$(N%):TAB(29):efac(N%):TAB(32):GOT
01120 ELSE GOT01130
1120 IF Pass=0 THEN PRINT:mnsqr(N%)
ELSE
PRINT:mnsqr(N%)/erv
1130 IF VPOS>21 THEN PROCrecontinue:VDU28,0,
24,39,5:CLS
1140 NEXT:ENDPROC
1150
1160 DEFPPROCheading(C$)
1170 PRINTC$;" TAB(21)"Effect on"
1180 PRINT"No.":TAB(4)"Change":TAB(23),
rslt$:TAB(32)
1190 IF Pass=0 THEN PRINT"Mean Sq" ELSE
PRINT"Fratio"
1200 PRINTSTRING$(39,"_"):ENDPROC
1210
1220 DEFPROCerror(Pass) Dof=0
1230 IF ext THEN 1310
1240 IF Pass THEN PRINTTAB(2,9)"Add
interactions to error estimate? "ELSE
PRINTTAB(0,9)"Enter No's of interac
tions you want to" "use as estimate of
the error variance."
1250 PRINTTAB(12)"<'0' to finish">
1260 REPEAT:err=VALFNinput(2,40,58):VDU9,9
1270 IF err=0 OR mnsqr(err)=0 THEN 1300
1280 erv=erv*mnsqr(err)
1290 mnsqr(err)=0:dof=dof+1:Dof=dof
1300 UNTIL err=0
1310 d=dof:IF Dof=dof erv=erv/dof
1320 IF dof>27 AND dof<60 THEN d=28
1330 IF dof>60 THEN d=29
1340 FOR N% = 1 TO d:READ f_ratio:NEXT
1350 RESTORE:ENDPROC
1360
1370 DEFPROCext
1380 ext=-1:CLS:PRINTTAB(1,12)"Enter the
error variance estimate ",erv=VALFNinput(5,40,58)
1390 CLS:PRINTTAB(1,12)"Enter the degrees
of freedom on which this error va-
riance is based.",dof=VALFNinput(5,40,58)
1400 PROCerror(1):PROCreprintout(1):ENDPROC
1410
1420 DATA 39.9,8.53,5.54,4.54,4.06,3.78,3.59,
3.46,3.36,3.28,3.23,3.18,3.14
1430 DATA 3.1,3.07,3.05,3.03,3.01,2.99,2.97,
2.96,2.95,2.94,2.93,2.92,2.91
1440 DATA 2.90,2.85,2.75 REM 90% Probability
1450 DATA 2.89,2.85,2.75 Points of Fratio for 1 to 27,>27,
1460 DATA 2.99 and >59 degrees of freedom
and >59 degrees of freedom

```

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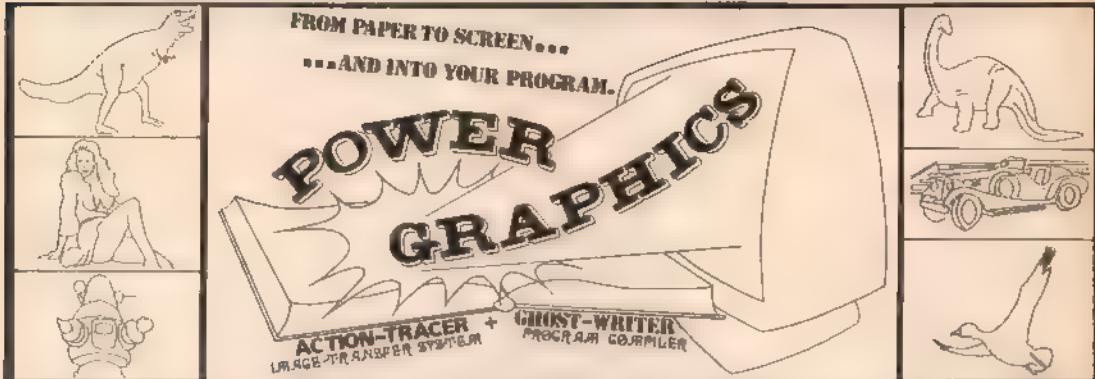
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# OPEN FORUM

**Open Forum** is for you to publish your programs and ideas. Take care that the listings you send in are all bug-free. Your documentation should start with a general description of the program and what it does and then give some detail of how the program is constructed. We will pay the *Program of the Week* double our new fee of £6 for each program published.

## Jackpot

on ZX81

The screen displays a fruit machine and all

the winning combinations possible. These can very easily be changed by changing lines 20 to line 35.

Line 47 to line 79 choose three different reels at random to be displayed for the

winnings. These can also very easily be changed by altering line 47. Add as many characters to the variable BS\$ as you like, then alter line 50 (let J = Int (Rndx?) + 1). The question mark should always be one more than the amount of characters in BS\$.

When all this is done and it is exactly as you desire it to be, save it on tape by typing Goto 120. You are now ready to run it. Hit key "R" to spin the reels.

### Graphics note

Line 47 = OX<sub>0</sub> (SHIFT ■) (SHIFT ■) (INV SPACE) (SHIFT Y) (INV C) (INV ?).

### LISTING FROM JACKPOT I

```

1 REM "JACKPOT"
2 PRINT "   A   "
3 PRINT "   A   "
4 PRINT "   A   "
5 PRINT "   A   "
6 PRINT "   A   "
7 PRINT "   A   "
8 PRINT "   A   "
9 PRINT "   A   "
10 PRINT "   A   "
11 PRINT "   A   "
12 PRINT "   A   "
13 PRINT "   A   "
14 PRINT "   A   "
15 PRINT "   A   "
16 PRINT "   A   "
17 PRINT "   A   "
18 PRINT "   A   "
19 PRINT "   A   "
20 PRINT AT 0,12; "B B B
1,00"
21 PRINT "   "
22 PRINT AT 2,12; "B B B
:90"
23 PRINT "   "
24 PRINT AT 4,12; "B B B
:70"
25 PRINT "   "
26 PRINT AT 6,12; "B B B
:60"
27 PRINT AT 8,12; "B B B
:50"
28 PRINT AT 10,12; "B B B
:40"
29 PRINT AT 12,12; "B B B
:30"
30 PRINT AT 14,12; "B B B
:20"
31 PRINT AT 16,12; "B B B
:10"
32 PRINT AT 18,12; "B B B
:10"
33 PRINT AT 20,12; "B B B
:10"

```



```

45 IF INKEY$ > "R" THEN GOTO 46
47 LET BS$ = "OX0 00000000000000000000000000000000"
48 DIM AS(3)
49 FOR F=1 TO 3
50 LET J=INT((Rnd*10)+1)
51 LET AS(F)=BS$(J)
52 NEXT F
53 FOR F=1 TO 3
54 FOR J=1 TO 7
55 PRINT AT 7,0+2+F; DS(J)
56 NEXT J
57 IF RND<.6 THEN GOTO 32
58 PRINT AT 7,0+2+F; AS(F)
59 NEXT F
60 IF INKEY$ <> "R" THEN GOTO 46
61 CLC
62 RUN
63 STOP
64 SHUE "JACKPOT"
65 RUN

```

### EXAMPLE FROM JACKPOT I



BBB	£1.00
■■■	0.90
■■■	0.70
■■■	0.60
■■■	0.50
■■■	0.50
■■■	0.50
■■■	0.50
■■■	0.30
■■■	0.20
■■■	0.10

**Jackpot**  
by Peter Morton

## Prism

on BBC

This program will produce a prism, which will rotate first in one direction, then the

other. The speed is controlled by the number added ■ A in the subroutines.

By adding a few points, a cube or more complex shape could be made.

### Program notes

■ Cursor off

- 18-31 Draws the prism  
■ This colour is easier on the eyes than normal white
- 39 Draws the foreground square
- 40-49 Decides which subroutine to use  
■ Calls appropriate subroutine
- 1000,2000 Subroutines. Try altering the numbers.

```

5 VDU23;8202;0;0;0;
10 A=100:GOS=1000
11 XXX=100
15 MODE4
17 C=A+600
18 MOVE A+XXX,500:DRAW C+XXX,500
20 MOVE A+XXX,500:DRAWA,900
21 MOVE C+XXX,500:DRAWC,900
30 MOVE C+XXX,500:DRAWC,300
31 MOVE A+XXX,500:DRAW A,300
32 GCDLO,1

```

```

39 DRAWA,900:DRAWC,900:DRAWC,300:
DRAWA,300:GCDLO,2
40 IF A+800>1280 THEN GOS=2000
48 IF A<0 THEN GOS=1000
49 IF XXX=1200 THEN GOS=1000
51 GOSUB GOS
55 GOTO15
1000 A=A+10:XXX=XXX-10:RETURN
2000 A=A-10:XXX=XXX+10:RETURN

```

**Prism**  
by M Weatherill

# OPEN FORUM

## Lunar Lander

on Spectrum

In the game you are a ground-based flight controller responsible for the guidance and safe landing of several modules returning to the moon's surface at bases A and B.

More points are awarded for landing at

B, as it is more difficult than landing at A. The real problem is bringing the landing speed of the modules down to required limits before fuel is used up.

Once a module has crashed the game is over.

### Program notes

User defined graphics: 1-2, 2026.

Draws scenery: 10, 100, 2001, 2025, 9813 & 9825.  
 Sets up variables: 110, 306, 2027.  
 Movement of module: 149-155, 320 & 310, 2020-  
 2023, 2030, 9821-9835.  
 Draws border: 2013.  
 Checks module striking scenery: 306 & 2029.  
 Prints red border — fuel low: 311 & 2031.  
 Module landing: 2040.  
 Instructions: 8999.  
 Module crash routine: 9998-9999.

```

1 LET O1=0: GO SUB 8999: PAUS
2 CLS : GO SUB 9002: FOR X=0
3 TO 7: READ A: POKE USA "A"+X,A:
4 NEXT X: DATA 126,195,255,126,24
5 35,65,231: LET Z=1: LET b=1: POKE
6 236568,8: LET SCORE=0: FOR X=0
7 TO 7: READ A: POKE USA "B"+X,A:
NEXT X: DATA 3,31,55,53,53,53,31
7: FOR X=0 TO 7: READ A: POKE USA
"C"+X,A: NEXT X: DATA 192,248
8,80,252,252,245,224
2 FOR X=0 TO 7: READ A: POKE
USR "E"+X,A: NEXT X: DATA 192,22
$,.112,55,28,52,0,0: FOR X=0 TO 7
: READ A: POKE USR "D"+X,A: NEXT
X: DATA 3,7,14,28,55,124,0,0
10 CLS : PLOT 0,55: DRAW 24,5
DRAW 8,-5: DRAW 16,0: DRAW 0,-2
: DRAW 16,0: DRAW 56,84: DRAW 24
4: DRAW 84,-64: DRAW 16,-56: D
RAW 8,8: DRAW 12,56: DRAW 28,4:
DRAW 8,52: DRAW 16,8: DRAW 16,-8
: 08 PRINT AT 15,8;"": AT 14,28;
110 LET FUEL=35: LET SPEED=0: L
ET b=1: LET b=2
140 IF INKEY$="" THEN LET b=b+1
: LET SPEED=SPEED+1: PRINT AT 0
1,b-1;"": AT 3,b-1;"": PRINT AT 3
,b+1;"": LET b=b+1
141 IF FUEL<0 THEN BORDER 2
140 IF INKEY$="8" THEN PRINT AT
3,b+1;"": LET FUEL=FUEL-2
145 IF INKEY$="9" AND b<0 THEN
LET FUEL=FUEL-.5: LET SPEED=SPE
ED+.5: PRINT AT 3,b+1;"": LET b
=b+2: BEEP .1,20
150 IF INKEY$="5" AND b>0 THEN
LET FUEL=FUEL-.5: PRINT AT 3,b+1
"": LET SPEED=SPEED+.5: LET b
b-1: BEEP .1,20
151 PRINT AT 3,17: BRIGHT 1: IN
K 2: "": BRIGHT 0
155 IF INKEY$="7" AND b>0 THEN
PRINT AT 3,b+1;"": LET SPEED=SP
ED-3: LET FUEL=FUEL-1: LET b=b
-1: BEEP .1,20
158 IF b=14 AND b=5 OR b=14 AND
b=4 THEN CLS : GO TO 9800
301 PLOT 248,0: DRAW 0,175: PLO
T 0,175: DRAW 0,-175
302 IF FUEL<0 THEN LET FUEL=0
303 IF SPEED<1 THEN LET SPEED=S
PEED+.4
304 PRINT AT 3,17: BRIGHT 1: IN
K 2: "": BRIGHT 0
305 IF SCREEN$ (3,b)>" " THEN
FOR I=0 TO 7: POKE USA "9"+I,RND
*255: NEXT I: PRINT AT 3,b+1: IN
K 6;"": FOR I=1 TO 100: NEXT I:
CLS : GO TO 9000
306 PRINT AT 0,0;"VELOCITY": SP
EED: "": AT 21,16;"SCORE": SCORE
: AT 0,15;"FUEL": FUEL: FOR I=0 T
O 15: PRINT AT 3,b+1;"": NEXT I
310 IF b=10 AND b=20 OR b=10 AN
B=19 THEN GO TO 2000
311 IF FUEL<1 THEN LET a=a+1: P
RINT AT 3,-1,b+1;"": AT 3,b+1;"": "
: GO TO 300
900 GO TO 111
2001 CLS : IF O1=0 THEN PLOT 152
,0: DRAW 56,16: DRAW 8,15: DRAW
8,0: DRAW 56,48: DRAW 8,-32: DR
AW 8,48: DRAW 36,0: PLOT 48,0: D
RAW 8,24: DRAW 8,0: DRAW 8,16: D
RAW 16,64: DRAW -24,40: DRAW -56
,0: LET O=3: LET U=15: PRINT AT
0,U;"": AT 0,-1,U;"": AT 0,0,U;""
2013 PLOT 0,0: DRAW 255,0: DRAW
158: DRAW -255,0: DRAW 0,-168
2020 IF INKEY$="8" THEN PRINT AT
0,b-1;"": AT 0,-1,U-1;"": AT 0,-1
,U+2;"": AT 0,U+2;"": LET U=U+1
2021 IF INKEY$="5" THEN PRINT AT
0,U+2;"": AT 0,-1,U+2;"": AT 0,U
-1;"": AT 0,-1,U-1;"": LET U=U-1
2022 IF INKEY$="7" AND 0<1>1 THE
N LET O=0-1: PRINT AT 0+1,W;""

```

```

: LET SPEED=SPEED-3: LET FUEL=FU
EL-1
2023 IF INKEY$="" THEN LET O=0+1
: PRINT AT 0-2,U;"": LET SPEED
:SPEED+1
2024 PRINT AT 0,U;"A": AT 0-1,W;
2025 IF O=10 AND O1=0 THEN CLS :
LET O1=1: LET G=0: IF O1=1 THEN
PLOT 120,32: DRAW INK 3,16,0,P
LOT 120,16: DRAW 16,0: DRAW 0,5
DRAW 48,0: DRAW -16,32: DRAW 0,
32: DRAW -16,24: DRAW -8,16: D
RAW 0,8,48: PLDT 120,16: DRAW 0,0,D
RAW -24,0: DRAW -32,48: DRAW 24,
40: DRAW -24,32: DRAW -16,32
: 0026 PRINT AT 0,U;"A": AT 0-1,W;
2027 IF SPEED<1 THEN LET SPEED=0
2028 IF FUEL<1 THEN LET FUEL=0
2029 IF SCREEN$ (0+1,W)>" " AND
ATTR (0+1,W)<>3 THEN GO TO 9998
: IF SCREEN$ (0+1,W+1)>" " AND
ATTR (0+1,W+1)<>3 THEN GO TO 999
2: IF SCREEN$ (0,W-1)>" " AND A
TTR (0,W)<>0 THEN GO TO 9998: IF
SCREEN$ (0,W+2)>" " AND ATTR (
0,W)<>0 THEN GO TO 9998
2030 IF INKEY$="8" THEN PRINT AT
0,U;"": AT 0-1,W;"": LET FUE
L=FUEL-2
2031 PRINT AT 1,0;"VELOCITY": SP
EED: "": IF FUEL<2 THEN PRI
NT AT 0-2,U;"": AT 0-1,W;"": "
: LET O=0+1: GO TO 2024
2032 PRINT AT 3,0;"VELOCITY": SP
EED: "": IF FUEL<0 THEN LET
SPEED=3
2033 PRINT AT 0,U-2;"": PRINT A
T 0,U-1;"": AT 0-1,U-1;"": AT 0,
U+2;"": AT 0-1,U+2;"": AT 0,
U+3;"": AT 0-1,U+3;"": AT 0,
U+4;"": AT 0-1,U+4;"": AT 0,
U+5;"": AT 0-1,U+5;"": AT 0,
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U+7;"": AT 0-1,U+7;"": AT 0,
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U+422;"": AT 0-1,U+422;"": AT 0,
U+423;"": AT 0-1,U+423;"": AT 0,
U+424;"":
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```

9821 IF INKEY$="" THEN LET g=g+1
    LET SPEED=SPEED+1: PRINT AT g-2,h;
9822 IF INKEY$="7" AND g-1>3 AND
    SPEED>0 THEN LET SPEED=SPEED-2:
    LET FUEL=FUEL-1: LET g=g-1: PRI
NT AT g+1,h;" "
9823 IF INKEY$="5" AND h>5 THEN
    LET h=h-1: PRINT AT g,h+2;" ";AT
g-1,h+2;" "
9824 IF INKEY$="6" AND h<28 THEN
    LET h=h+1: PRINT AT g,h-1;" ";AT
g-1,h-1;" "
9825 PLOT 0,32: DRAW 70,16: DRAW
24,40: DRAW 0,-32: DRAW 40,0: D
RAW 0,40: DRAW 24,-24: DRAW 48,0
: DRAW -8,-54
9827 IF SPEED<0 THEN LET SPEED=-5
SPEED+4
9829 IF INKEY$="6" THEN PRINT AT
g-1,h;" ";AT g,h;"X": LET FUE
L=FUEL-2
9830 IF FUEL<0 THEN LET FUEL=0:
IF FUEL<1 THEN LET g=g+1: PRINT
AT g-2,h;" ";PRINT AT g,h;"X"
:AT g-1,h;" ";: IF SCREEN$ (g+1,
h) <> " " THEN GO TO 9999: IF SCRE
ENS (g+1,h+1) <> " " THEN GO TO 99
99: GO TO 9825
9832 IF SCREEN$ (g,h-1) <> " " AND
ATTR (g,h) <> 3 THEN GO TO 9999
9833 IF SCREEN$ (g,h+2) <> " " AND
ATTR (g,h) <> 3 THEN GO TO 9999
9834 PRINT AT g-1,h;" ";AT g-1,h
-1;" ";AT g+1,h;" ";AT g,h;"X"
9835 PLOT INK 3,104,54: DRAW INK
9,16,0: IF g=15 AND h=13 AND SP
EED>0 AND SPEED<3 THEN PAUSE 0:
LET SCORE=SCORE+2: FOR F=0 TO 20
0: NEXT F: CLS : GO TO 9999

```

```

9836 PRINT AT 1,1;"VELOCITY (";SP
EED;")";AT 2,1;"FUEL (";FUEL;")"
:AT 3,1;"SCORE (";SCORE;")"
9837 IF FUEL<0 THEN BORDER 2
9880 GO TO 9820
9911 BORDER 0: CLS : PAUSE 50: F
PRINT AT 10,0;"ALPHA-CORRECT SURF
ACE CONTACT";AT 11,0;"STANDBY C
ONTROLLER FOR NEXT MODULE ARR
IVING ON SCHEDULE";" "Press any
key to continue next module":
PAUSE 0: GO TO 10
9999 BORDER 0: FOR F=0 TO 9: FOR
X=1 TO 8: POKE USR "D"+X,RND#25
5: NEXT X: PRINT AT 0,W-1,INK 8
:FLASH 1;" ";AT 0-1,W-1,INK 8
:FLASH 1;" ";AT 0-1,W,INK 8: NEXT
F: PRINT AT 0,W;" ";AT 0-1,W;" "
:CLS : FOR F=0 TO 21: PAUSE
5: PRINT AT F,8;"END OF MISSION
":AT F-1,8;" ";NEXT F: PRINT
T F: PRINT AT 10,0;"Press any ke
y for another game": PAUSE 0: RU
N
9999 BORDER 0: FOR F=0 TO 10: FO
R X=0 TO 7: POKE USR "D"+X,RND#25
5: NEXT X: PRINT AT 0,W-1,INK 8
:FLASH 1;" ";AT 0-1,W-1,INK 8
:FLASH 1;" ";AT 0-1,W,INK 8: NEXT
F: PRINT AT F,8;"END OF MISSION":AT
F-1,8;" ";NEXT F: PRINT
T 10,0;"Press any key for anothe
r game": PAUSE 0: RUN

```

Lunar Lander  
by G Dyer

## Colour Mix

on BBC Micro

I have enclosed a utility program for either

model of the BBC computer which will allow the user to intermix any two colours from a range of eight available colours.

This will produce fairly reasonable colours you would expect if you mixed the colours as if they were paint.

But as many readers will know they can't be mixed as well, as they are not 'pure' colours. The produced colours will not be true, but I hope this short program will help readers to make their choice for colour mixes good ones.

```

10
20 REM" Colour Mix
30 A$=" Author: Mark Colson
40 "
50 MODE7
60 VDU23;8202;0;0;0;
70 VDU23,224,170,85,170,85,170,
85,170,85
80 PROCintro
90 MODE4
100 VDU23;8202;0;0;0;
110 VDU19,0,A-1;0;
120 VDU19,1,B-1;0;
130 FORA$=1TO1240
140 VDU224
150 NEXT
160 A$=GET$
170 RUN
180
190 DEF PROCintro
200 PRINTCHR#157
210 FORF=1TO2:PRINTCHR#157CHR#141
CHR#129CHR#136TAB(14)"COLOUR
MIX":NEXTF

```

```

220 PRINTCHR#157
230 PRINT" "CHR#131CHR#157CHR#130
TAB(6)A$" "CHR#156
240 PRINTCHR#157CHR#132"PICK TWO
OF THESE COLOURS (BY NUMBER)"
250 PRINTCHR#157
260 DATABLACK,RED,GREEN,YELLOW,
BLUE,MAGENTA,CYAN,WHITE
270 FORF=1TO8
280 READA$*
290 PRINTCHR#157CHR#133TAB(5)F;" .
"A$
300 NEXTF
310 PRINTCHR#157
320 PRINTCHR#133CHR#152CHR#135TAB
(4)"Press any key after to
continue "CHR#156
330 A=VAL(GET$)
340 B=VAL(GET$)
350 ENDPROC

```

>RUN

Colour Mix  
by Mark Colson

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Fast and furious SPECTRUM version has SOUND and USER GRAPHICS. 3 LEVELS. 3 WAVES. MOTHER SHIP. HIGH SCORE. RE-FUELLING. RAID FIRE. SMART BOMBS and LASER SHIELD. PCW "ONE OF THE BEST SINCLAIR GAMES YET". Only £4.50. 16K SPECTRUM - 18K ZX81.

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A COMPLETE SIMULATION of the BEST SELLING BOARD GAME, you know PARK LANE and all that. UP TO SIX PLAYERS can compete with the MICRO doing all the WORK. Acts as DICE THROWER, BOARD RENT COLLECTOR, UNPIRE BANK RULE BOOK, ACCOUNTANT and PROPERTY RECORD. SUPER GRAPHICS by Gary Kennedy (thanks mate). GAME SAVE with winner so far report. COMPLETE with INSTRUCTION BOOKLET. The ULTIMATE in FAMILY GAMES. Don't MONOPOLISE YOUR MICRO. AMAZE all your friends and family. (Can you see your GRANNY on a MICRO?) ONLY £4.95. 16K ZX81 VERSION ALSO £4.95.

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When YOU SAVED the GALAXY, SCRAMBLED or whatever else you do on your MICRO, what about a GUNFIGHT? Play the SPECTRUM or YOUR PALS THREE LEVELS. FULL FEATURES, CACTI, COFFINS, WAGONS, RAPID or SINGLE SHOTS. SUPERB GRAPHICS, GOOD SOUND including DEATH MARCH ESCAPE ISM on TAPE for JUST £4.50

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Takes over when BIN and the DEMO tape left off. How would you like 273 different user defined GRAPHICS on a 16K SPECTRUM or a GRAND 32K for a 48K. All of these can be displayed on the screen at the SAME TIME. UDG's are stored as PAGES and any TWO PAGES may be exchanged in memory. FILES can be LOADED FROM or SAVED TO TAPE LOAD into any page location. TURN a UDG 90°, turn, FLIP a SHAPE over, REVERSE a SHAPE, EXPAND 16x of a CHARACTER into a full character, UP, DOWN, LEFT or RIGHT 16x one PIXELS. SHAPE FILES are included on TAPE (INCLUDING a 64 CHARACTERS per LINE DISPLAY). COMPLETE with DEMO PROGRAM and INSTRUCTIONS. JUST RELEASED in £7.00. 48K or 16K SPECTRUM only.

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Up to six players allowed. Plays the classic dice game of strategy. All-electric scorepad complete with Gary's "Chunky Look" character set. All cheating and errors rejected by your electronic umpire. Up-date your games cupboard for £5.50. 48K only.

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FOR BUSINESS and PROFESSIONAL use. Ideal for WHAT IF situations. CASH FLOW FORECASTING and ANALYSING RELATED figures. 64 character display option. FORMULA may be MATHEMATICAL or LOGICAL. MENU of FUNCTIONS. SAVE and LOAD DATA to TAPE. FULL instructions included. LITERALLY HUNDREDS of USES. BOTH 48K and 16K SPECTRUM PROGRAMS on ONE TAPE. JUST £7.00. EXCELLENT VALUE

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A SPECTRUM TOOLKIT. Position independent and just 1450 BYTES. Facilities: RENUMBER lines or blocks any increment or start, BLOCK OR LINE MOVE including a RENUMBER into place if required, BLOCK OR LINE ERASE, CHANGE SELECTED STRINGS (NAMES OR CONTENTS), DUMP variable names and values (usable in a loop), DISPLAY PROGRAM or PROGRAM plus VARIABLE SIZE, INSTANT and CLEAN. JUST £8.95 with explicit instructions.

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See this game at the 7th ZX Microfair, Alexandra Palace, June 4  
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## Parachute Attack

on Lynx

This is a game for the Lynx involving falling parachutes.

You are on a hillside and parachutes are

falling from the sky and into a boat.

You must shoot them before they get there. You are given six skill levels which determine how and how fast the parachutes falls.

Shoot with the space bar — you have 20 shots. The computer will bleep when you

have hit a parachute.

### Variables

T=Total points  
E=Skill level and speed of parachute  
A+B=Co-ordinates  
Q\$=Points or Point  
R = Parachutes that got away

```

100 REM *** PARACHUTE ATTACK ***
110 REM *** JOANNA GREENWOOD ***
120 LET R=0
130 LET T=0
140 LET M=0
150 LET X=160
160 LET U=190
170 LET P=0
180 LET N=0
190 CLS
200 INPUT "SKILL LEVEL (1 TO 6)"IE
210 IF E>6 THEN GOTO 200
220 LET E=E+1
230 RANDOM
240 PAPER 1
250 CLS
260 INK 4
270 FOR D=135 TO 238
280 LET U=U-1
290 PLOT 0,U,D
300 PLOT 2,255,D
310 NEXT D
320 INK 0
330 FOR D=120 TO 134
340 PLOT 0,212,G
350 PLOT 2,215,G
360 NEXT G
370 INK 0
380 FOR L=115 TO 119
390 PLOT 0,190,L
400 PLOT 2,220,L
410 NEXT L
420 INK 0
430 FOR J=231 TO 247
440 PLOT 0,0,J
450 PLOT 2,255,J
460 NEXT J
470 INK 0
480 FOR Y=215 TO 229
490 LET K=K+1
500 LET H=N+1
510 PLOT 0,M,Y
520 PLOT 2,X,Y
530 NEXT Y
540 LET S=5
550 LET A=RAND(90)+10
560 INK 7
570 PLOT 4,A,B
580 PLOT 0,A-2,B+1
590 PLOT 2,A+2,B+1
600 PLOT 0,A-4,B+2
610 PLOT 2,A+4,B+2
620 PLOT 0,A-5,B+3
630 PLOT 2,A+5,B+3
640 PLOT 0,A-5,B+4
650 PLOT 2,A+5,B+4
660 PLOT 0,A-4,B+5
670 PLOT 2,A,B+13
680 PLOT 0,A-4,B+5
690 PLOT 2,A,B+13
700 PLOT 0,A,B+5
710 PLOT 2,A,B+13
720 IF N=9 THEN GOTO 1020
730 IF INK=1 THEN GOTO 770
740 INK 1
750 IF KEY$=" " THEN GOTO 820
760 GOTO 570
770 LET B=B+E
780 IF B>203 THEN LET R=R+1
790 IF B>203 THEN GOTO 540
800 IF KEY$=" " THEN GOTO 820
810 GOTO 360
820 INK 0
830 PLOT 0,199,117
840 PLOT 2,A,117
850 IF INK=1 THEN GOTO 900
860 LET P=P+1
870 IF P>20 THEN GOTO 1040
880 IF INK=1
890 GOTO 630
900 IF B+8=117 THEN GOTO 950
910 IF B+8=117 THEN GOTO 950
920 IF B+8=117 THEN GOTO 950
930 IF B+7=117 THEN GOTO 950
940 GOTO 570
950 LET T=T+1
960 DEEP 50,100,63
970 INK 7
980 PAUSE 2500
990 LET N=9
1000 INK 1
1010 GOTO 570
1020 LET N=0
1030 GOTO 540
1040 CLS
1050 INK 24
1060 IF T>1 THEN LET Q$="R"
1070 ELSE LET Q$=" "
1080 PRINT "YOU SCORED "T" POINTS"
1090 PRINT "USING 20 SHOTS"
1100 IF R>1 THEN LET Q$="R"
1110 ELSE LET Q$=" "
1120 PRINT R;" PARACHUTE"ID$;" GOT AWAY"
1130 YOU 25
1140 PRINT "DO YOU WOULD YOU LIKE ANOTHER GO (Y/N)"
1150 IF Q$="Y" THEN GOTO 100
1160 END

```

**Parachute Attack**  
by Joanna Greenwood

## Early Bird

on Spectrum

You are a poor little bird who is stranded in Mr Green's garden with a broken wing. But be careful, a cat is on the prowl and out to devour you.

In the garden there is a puddle that slowly soaks away. You must avoid hopping into it or you will drown.

In order to recover you must catch 10 worms.

Full instructions are contained in the program.

```

10 SUB 990
10 FOR I=2 TO 99: PLINE 1 : PLINE
11 DATA 56,40,56,16,146,64,56,
12 DATA 26,40,56,16,146,64,56,
13 DATA 165,90,189,90,63,34
14 DATA 24,24,36,219,219,26,24
15 DATA 0,3,4,100,166,144,0,0
16 DATA 199,105,150,224,224,125
17 DATA 6,105,68,50,26,46,16,2
18 DATA 0,0,0,0,0,0,0,0
19 DATA 96,205,146,63,34,34
20 LET Z=0: LET T=0: GO SUB 200
21 LET X=10: LET U=30
22 LET EX=INT(RAND*81): LET EY
23 LET T=INT(RAND*13): LET A=INT(RAND*13)

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24 T 10H GO TO 120
25 LET L=0
26 IF Z>100 THEN LET Z=100: INK
27 LET Z=Z+1: INK 2: Z=Z-1: INK
28 GO TO 300
29 PAPER 4: INK 4: INVERSE 0
30 SET 0: EIGHT 0: FLASH 0: ERDRE
31 SET 0: EIGHT 0: FLASH 0: ERDRE
32 FOR I=0 TO 31: PRINT INK 0:
33 AT 0,111,111,111,111,111,111,111
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290 AT 0,111,111,111,111,111,111,111
291 AT 0,111,111,111,111,111,111,111
292 AT 0,111,111,111,111,111,111,111
293 AT 0,111,111,111,111,111,111,111
294 AT 0,111,111,111,111,111,111,111
295 AT 0,111,111,111,111,111,111,111
296 AT 0,111,111,111,111,111,111,111
297 AT 0,111,111,111,111,111,111,111
298 AT 0,111,111,111,111,111,111,111
299 AT 0,111,111,111,111,111,111,111
300 AT 0,111,111,111,111,111,111,111
301 AT 0,111,111,111,111,111,111,111
302 AT 0,111,111,111,111,111,111,111
303 AT 0,111,111,111,111,111,111,111
304 AT 0,111,111,111,111,111,111,111
305 AT 0,111,111,111,111,111,111,111
306 AT 0,111,111,111,111,111,111,111
307 AT 0,111,111,111,111,111,111,111
308 AT 0,111,111,111,111,111,111,111
309 AT 0,111,111,111,111,111,111,111
310 AT 0,111,111,111,111,111,111,111
311 AT 0,111,111,111,111,111,111,111
312 AT 0,111,111,111,111,111,111,11
```

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# OPEN FORUM

```

3,0,1 PRINT S,21 PRINT S,6,1
260 FOR I=1 TO 20: PRINT AT I,
5; PAPER 0; BRIGHT 1;
290 FOR I=1 TO 20: PRINT PAPER
6; INK RND*I+2; HT RND*218; AND*2
2+I; CIRCLE (RND*2)+1441; NEXT I
505 RETURN
236 LET X=10: LET Y=15
237 FOR I=1 TO 100: PRINT HI X,
Y; INK S,1
298 LET X=X+RND*1.5-RND*1.5; LE
T Y=Y+RND*1.5-RND*1.5; IF X=X-(x
+17)+(13): LET Y=Y-(y+30)+19/6
199 NEXT I: RETURN
300 LET X=1-X: LET Y=1-Y: PRINT ■
T X,Y;
305 LET X=X+(INKEY$="5" AND X<1
7) OR INKEY$="7" AND X>1): LET Y=Y
+(INKEY$="9" AND Y<13)-(INKEY$="5"
AND Y>13): IF Y>11 THEN LET Y
=11-Y+15;
310 IF X>INT (X+1.5) AND Y=INT (Y
+1.5) THEN GO TO 300
305 IF X>INT (X+1.5) AND Y=INT (Y
+1.5) THEN GO TO 300
308 IF ATTR (X,Y)=37 THEN GO TO
850
310 IF ATTR (X,Y)=36 THEN LET
X=X1: LET Y=Y1
315 IF AND>1.5-1 THEN PRINT AT
ND*15+1,HD*22+1
320 PRINT AT X,1: INK 2: DS
325 LET I=1: LET TAB0: PRINT A
330 LET A=+1+(A(X AND HTR) (A
+1)+(A(X AND HTR) (A-1)+1
)>3): LET B=+1+(B(Y AND HTR)
(B+1)+(B(Y AND HTR) (B-1)>3))
331 LET I= I+1(X-13)*11: LET D
=B+1.5-11/100
332 LET B=B-1: LET A=A+1
333 IF A=1 AND B=4 THEN GO TO 9
850
360 PRINT AT 3,6; INK E,B
360 LET UX1=UX: LET WH1=W1
370 PRINT AT UX,WY: "1": LET UX=
WY+RND-RND: LET WY=WY+RND-RND: I
F ATTR UX,WY>1.36 THEN LET UX=UX
X1: LET WY=WY1
380 PRINT AT UX,WY; INK 1; "D"
380 GO TO 360
385 FOR I=10 TO -11 STEP -2: BE
EP .05.: DULP .05.: #+2 BEEP .05

```

```

1+3 REM 1
300 PAUSE 30: BORDER 0: PAPER 0
INK 7: CLS
870 PRINT "Birds can't swim wi
th a broken wing."
880 GO TO 880
900 FOR I=20 TO 0 STEP -1/5: BE
EP .05.: BEEP .1.30: NEXT I
910 PAUSE 30: BORDER 0: PAPER 0
INK 7: CLS
920 PRINT "...The cat needed a
#1000... You needed to eat "
"10-30... more worms... to abend y
our wing."
930 GO TO 930
950 LET SC=C+1: LET U=U+1: IF
SC=16 THEN GO TO 920
955 PRINT HI 4+A, INK 1/4, PAPER
0; BRIGHT 1/3: FOR I=1 TO 17 P
RINT AT I,1
965 PAUSE 11: GO TO 100
965 PAUSE 30: BORDER 0: PAPER 0
INK 3: CLS
970 PRINT "Your wing is mended
and you can fly back to your ne
t."
980 PRINT "Another game 19/01 ?"
985 INPUT 98: IF 98="Y" OR 98=""
THEN RUN 98
987 STOP
990 CLS: PAPER 7: INK 0: BORDER
4: CLS: PRINT TAB 6, "THE EARL
Y BIRDS": "Good morning, this m
orning you are a bird. A poor inj
ured bird. You lie on the ground
because you sang so beautifully
somewhere there are ten
birds here. There is a cat. The
cat is there to weaken with b
ut speeds up through the game.
There is a person in the
room that must be avoided
but that person into the ground
slowly."
991 PRINT " " TO MOVE USE KEYS
5 TO 8.
992 PRINT " "Press any key to s
tart."
995 IF INKEY$="" THEN GO TO 995
999 CLS: RETURN

```

**Early Bird**  
by Richard Evans

## DRAGON 32 ACE HIGH



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## FEATURING The ZX Spectrum—Your Personal Computer

Ian McLean, Simon Rushbrook Williams & Peter Williams

Written in an informal, friendly style, this practical guide to the ZX Spectrum is ideal for first-time users. Clear diagrams show you how to master the Spectrum's keyboard and press the correct keys for various functions. Storing information, making calculations, sound, and graphics are carefully explained, and there is a special section on making music on the Spectrum.

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## OPEN FORUM

### Prime Number

on Vic20

This program works on any Vic20 and many other machines with the minimum of adjustment.

The user types in a number above 1 and the computer will then proceed to work out all the prime numbers between 1 and your number. The results will be printed out on the screen unless the following adjustment

is made to print it out on the printer:

add 85 OPEN 1,4,CMD1  
change 120 PRINT#1,CLOSE:END

Other machine users (i.e. the Sinclair Z80 command will have to be inserted to 1) Open the printer command channel in line 85, and 2) Close the printer command channel in the line 120.

Other machine users (i.e. the Sinclair ZX81 and Spectrum) will also have to delete the cursor commands in lines 60, 70 and 80.

### Program notes

Line

60 (Cursor command — Clear Screen) asks for the user to type in a number.

70 (Cursor command — Cursor Down) demonstrates what the number shows.

80 (Cursor command — Cursor Down) INPUTS the number and checks to see whether it is valid.

90 PRINTS the first prime number (2) and starts the FOR-NEXT loop.

100 Checks to see if the number is prime, and if it is, PRINTs it.

110 Identifies that the number is not prime.

120 Terminates the program.

```
10 REM*****  
20 REM*  
25 REM*      PRIME NUMBER FIND *  
30 REM*  
40 REM*      BY M. A. VALENTINE *  
45 REM*  
50 REM******  
60 PRINT"LCRJENTER LAST NUMBER TO BE CHECKED."  
70 PRINT"[CD]I.E. '1000' CHECKS FROM 2 TO 1000."  
80 INPUT "[CD]":N$:N=VAL(N$):IF N>200:N=INT(N):THEN 80  
90 PRINT" 2":FOR C=2TO N  
100 FOR A=2TO SQR(C):IF C/A<>INT(C/A)THENNEXT:A=PRINT" "C:NEXT:GOTO120  
110 A=SQR(C):NEXT:NEXT  
120 END
```

Prime Number.  
by M Valentine

## Adventure Competition

Write an adventure game and win a Commodore 64!

*Popular Computing Weekly* is offering a star prize of a Commodore 64 for the best adventure game written for any home micro — PLUS — a special prize of a Vic20 for the best essay on an adventure theme — PLUS — for the next 10 runners-up, two Commodore adventure games.

Each week during May, *Popular Computing Weekly* will publish a coupon — simply cut out any three and send them in with your entry.

The best adventure games are ideally a combination of action and logical riddles. For instance to open a door the player should not merely have to find the magic word, but have to solve a puzzle in order to progress to the next location. Good graphics obviously enhance a program ... and we'll be looking for a game that makes imaginative use of graphics, although that does not mean that a text-only program will be eliminated.

Other things we will be looking for are the surprise twists that make a program worth coming back to again and again.

And remember, don't make your game too difficult in the early stages — adventuring novices should have a chance to get some way into the game before getting stuck!

For those of you submitting scenarios with your program, think of it as a guide line for a programmer. Draw a map showing location objects and other important details of your

adventure, and compile a dictionary of key words that your program will accept.

If you do not want to write a full-blown adventure game, you can still enter the competition by writing an essay (up to 2,000 words) on an original adventure theme. A Vic20 will be awarded to the essay which describes the most original and interesting adventure game.

The competition will be judged by Tony Bridge and *Popular Computing Weekly* editor Brendon Gore.

#### PRIZES

- 1 Commodore 64
- 2 Vic20
- 3 Two Commodore adventure games of your choice for 10 runners-up

#### HOW TO ENTER

All you have to do to enter this competition is collect the coupons from three issues of the magazine and send them together with your entry (stating which machine your game is for) to:

*Popular Computing Weekly*  
Adventure Competition  
Midhouse Court  
19 Whitcomb Street  
London WC2 7HF

#### RULES

- 1 Each entry must consist of your adventure, or essay together with three coupons and your name and address.
- 2 Closing date for the Adventure Competition is 30 June 1983.
- 3 The judges decision is final.
- 4 No employees of Sunshine Publications Ltd, or their families, will be eligible to enter.

## Adventure Competition

4

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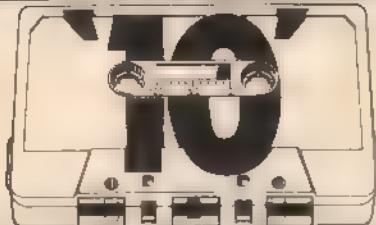
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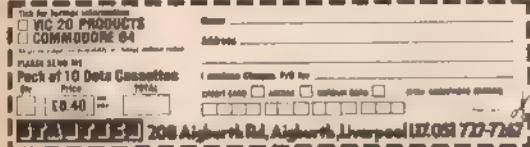
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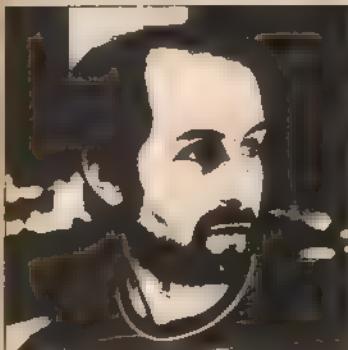
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## Tony Bridge's Adventure Corner



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If all this is familiar to you, then you have probably played *Dungeons and Dragons*. *The Valley*, from Kayde Software, is a program for the expanded Spectrum, Vic20, Dragon, Newbrain and Oric, based on the combat system and monsters of that most popular Role Playing game. *Computing Today*, over a year ago, featured a program of the same name. Documented in great detail, it was written in Petsoft, with conversions available for the TSR and Sharp machines.

Generally, the program works well, although a black mark must be given to Kayde as the program does not Auto-run after Loading. This is a silly mistake nowadays — it's so easy to include the routine, and gives much better impression to the player.

However, the rest of the program is much better. After selecting the skill level you want to play at (for some reason called "Speed Level" — there's no speeding involved in this game!), you are asked to choose a character. In true D&D fashion you may be wizard, cleric, thinker, warrior or barbarian — they all have their own effect on the later stages of the game, and you'll probably have your own favourite.

Then, the first map is drawn. A winding road, the "safe path", crosses a barren landscape which contains a few swamps and forests. At either end of the road is a castle, a refuge at which you may rest and rejuvenate and at which you must return treasures found along the way.

The article accompanying the original program went into the background of the scenario in great detail, with one of those high-flown gothic stories of magic and chivalry. Unfortunately, there is none of that here.

The general atmosphere, however, is medieval — you can tell that because of the language (there are lots of "thees" and "thous"), and the shape that represents you, a shield with white cross.

While on the safe path, no harm will befall you, as no creature will attack — but that's rather boring, and you certainly won't progress that way. Step off the path and you're fair game for any passing creature. The object is to move across the map picking up experience points along the way, as well as treasure, of course, like any self-respecting knight. Each swamp and forest contains temples or lodges, with several rooms, in some of which may be secreted the various gems and hoards of gold. These buildings are surrounded by lakes, inhabited, naturally, or rather unnaturally, by watery monsters.

The database for monster generation contains such lovely things as ringwraiths, harpies, minotaurs and wyverns, amongst many others. The monsters are of two sorts — natural or supernatural. You must make the appropriate reaction to each kind, by using one of three kinds of spells, or using your sword to hack at specified part of the creature.

The ultimate aim of the adventure is to go from lowly Monsterfood (rating #1) through Necromancer and Paladin to Master of Destiny (rating #28). To get your rating, you must return to one of the castles with the various rings and helms

that you've picked up in your travels.

On the H-scale (where Melbourne House's *The Hobbit* is assumed to have an arbitrary score of 20), *The Valley* must rate about 17. A vital point is lost because of the lack of the presentation at the start and for having no Auto-run. Another point off for not having a Save routine. This is fairly serious, as the game will obviously take many hours to play.

However, the reason for losing the third point (the program is written in slow Basic) may actually help you. The lack of speed is regrettable, though you can live with it, but being written in a high-level language the program is easily adaptable. It should be fairly easy to write in your own Save character and program routine.

So, although the program shows its age, the adventure is nevertheless going to give you hours of non-cerebral, bash-about, rip-roaring fun!

This series of articles is designed for novice and experienced Adventurers alike. Each week Tony Bridge will be looking at different Adventures and advising you on some of the problems and pitfalls you can expect to encounter. So, if you have an Adventure you want reviewed, or if you are stuck in an Adventure and cannot progress any further, write to Tony Bridge, Adventure Corner, *Popular Computing Weekly*, Hobhouse Court, 19 Whitcomb Street, London WC2 7HF.

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The highest score sent in so far this month is 9968 from Carl Doran of Skidby Mill, N. Humberside. If you have a higher score, you could still win this month's £10 — but hurry, entries close on May 31.

### Notes

1. Each entry must consist of a ZX printout and your name and address.

2) Closing date for this month's *Cruising* challenge entries is May 31.

3) The highest score each month will receive £10.

4) High scores cannot be transferred from one month to another.

5) The judges' decision is final.

6) No employees of Sunshine Publications Ltd. or their families, will be eligible to enter.

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**ATARI COMPUTER CARTRIDGES**, Chess, Space Invaders, Music Composer, Star Raiders, Jumbo Set Pilot, Submarine Commander. All for £80 or wth epkr. Tel: Leeds (0532) 531960.

**ZX81 16K**, DKTronics keyboard and graphics. Rom, over £1200 software, two books, Abacus controller and all leads, £150. Tel: Winscombe 3145 after 4.30.

**BARGAIN ATARI VSC** + 7 cartridges including PacMan, Star Wars, cost £270, sell £120. Telephone 0742-306854

**ACORN ATOM** 12k Rom, 12k Ram, Sony cassette recorder and 12 good games programs, £110. Tel: 01-568 4254 after 5 pm.

**ZX81 16K FILESIXTY KEYBOARD**, £90 **III** software including Scramble, Asteroids, Mazogs, 3D Defender, adventure games etc. All for £90. Tel: 051-521 6109 evenings.

**LYNX 48K**, hardly used, unwanted gift, boxed etc, £180. Tel: Brighton (0273) 35909 after 5 pm.

**VIC20 + COMMODORE 16K** Ram pack + C2N cassette unit. Still under guarantee. Bargain at £180 onto Tel: Tamworth 286939 after 5 pm.

**ATARI 400 16K** + basic cartridge, £125, as new. Tel: (0202) 517342.

**ZX81 + 16K RAM**. Fully boxed including software, only £40. Tel: (0226) 382851

**JUPITER ACE**. Hardly used, £85 onto. Tel: Gravesend (0474) 61608.

**TR800 L2/16K** with CTR80, green screen, lower-case mode, sound monitor, RS232 interface + £200 software (including script), £350 Tel: Gravesend 332817 evenings.

**VIC SOFTWARE SUPER EXPANDER**, Vic graphics £25, three Bug-Byteline tapes £10. Woodstock Castle £15, three-slot Motherboard + £80 £30, stick light pen £15. Rabbit Myriad plus Charsel 20, £10. Contact P. Boyl, 6 Whifflefield Road, Holbury, Hants.

**CREED 78 TELEPRINTER (CASED)**, with modem/dial unit, paper, etc. Very good condition, £50. Buyer collects. Tel: Stratford-on-Avon (0789) 69571.

## Computer Swap 01-930 3266

Free readers entries to buy or sell a computer.  
Ring 01-930 3266 and give us the details.

## Spectrums for sale

**48K SPECTRUM** with DK Tronics keyboard, with numeric pad and built-in light pen + brand new Kempston joystick and additional sound generator which can produce sounds that would make a BBC user jealous, £260. Tel: Rainham (Essex) 23341.

**48K SPECTRUM** with ZX printer, £160 Tel: 0222 867086

**48K SPECTRUM**, 10 weeks old, £300 software, all top games, £160. Tel: 061-336 5954.

**SPECTRUM 16K**, mint condition. Lots of software including cassettes and magazines, £110. Tel: 01-870 2235.

**16K SPECTRUM**. Issue two + Horizons tape, two Space Invaders, £75. Tel: 01-337 0968.

**ZX81 16K + DKTronics keyboard and £30 software**, £85 onto. Tel: 0822 676810 after 4 pm.

**16K SPECTRUM + software** including Scramble and Avenger, £80. Tel: 01-304 5974.

**16K SPECTRUM** with lots of software, books, print and plotters, £130. Tel: Bedford 212646 after June 4.

**16K SPECTRUM**. Leaving country, £65 onto. Tel: 051-366 8223 (anytime).

## ZX81s for sale

**16K ZX81** with Redditch keyboard, £60 of software, magazines and two manuals. Asking £90 onto. Tel: 0292 89280. Ayr, Scotland.

**ZX81 1K + software, manual, leads**, four months old. Upgrading to Spectrum, £35. Tel: Llanbody (099 46) 211 after 4 pm.

**ZX81, 16K**, with Fuller keyboard, books and software, £100. Tel: 051-327 6629 after 6 pm.

**16K RAM PACK** for ZX81, £20. Brand new, under guarantee from April. Unused. Tel: Stubbington 662787

**16K ZX81** with DKTronics keyboard, printer, extra paper, AGS joystick converter, one joystick, high resolution graphics pack, £50 of software + magazines, £100 onto. Tel: 01-883 3653

**ZX81 16K** with Dean Electronics keyboard - OS sound board + motherboard - £50 of software + books, worth £180 sell for £90. Tel: 01-854 2987 after 6 pm.

**ZX81 1K**, excellent condition all leads power pack, manuals, some software, £30 for quick sale. Tel: Mr Leete, 0753 747111 (office hours).

**ZX81 16K** with full size keyboard and lots of software £80. Tel: Crofton 600263

**16K ZX81** with Press keyboard + manuals and leads + four tapes and a few magazines £60. Tel: 499-4374 (after 5 pm).

**ZX81 - 16K**, Quicksilver soundboard motherboard, DK Tronics graphics board. Can be sold separately, £90. Tel: Tunbridge Wells 29101.

**16K ZX81** with Redditch keyboard, Abacus controller, printer and books + games, £75. Tel: Reading 475826.

**ZX81 + 16K**, stillboxed + over £100 of software, £100 onto. Tel: Evesham 2487.

**16K ZX81** with File 60 keyboard and beginner's book, £65. Tel: Crawley 863922.

**ZX81 SINCLAIR 16K** with manuals and leads etc, also £40 of software. Tel: 045-612485 (after 5 pm).

**ZX81 - unused 16K + manual etc** Pro keyboard + £45 software, £80. Tel: Dace, Crawley (0460) 74667 after 8 pm.

**ZX81 + 16K Ram**, DK Tronics keyboard, all leads, manual and books, also a lot of software, £100 onto. Tel: Harlow 31079 after 7 pm.

**ZX81, 16K**, machine code book three books, software Scramble, 3D Defender, three adventures, magazines, £200. Yours for £130 onto. Tel: 01-995 6018 (after 5 pm).

**16K ZX81** with soundbox, 16 tapes, all leads, etc. Good condition, £98. Tel: 397-8136

**ZX81, 16K**, three game tapes for £45 Tel: Newton-le-Willows (Merseyside) 21444.

**ZX81, 16K**, with all leads, lot of software, including Frogger, 3D Monster Maze and Scramble Tel: Leeds 652389 after 5 pm.

**ZX81, 1K**, with keyboard and software, £45 onto. Tel: 0241 52507.

**ZX81, 16K and Zonix III** soundpack + 70 tapes, 20 magazines + two books, £80 onto Tel: (Crayford) 0254-859

**ZX81, 16K**, printer and paper, manuals, books, worth £140, £100 onto Tel: Dudley 236925 (after 8 pm).

**ZX81, 1K + keyboard** £35 Tel: 01-603 5644

## Dragons for sale

**DRAGON 32**, 8 months old + cassette recorder, joysticks, software, £200. Tel: 0702 545575

**DRAGON 32** with cassette recorder, 2 joysticks, parallel printer interface, cable, manuals, books, magazine articles + reviews, software, blank tapes, worth £300+, sell for £225. Tel: Coventry 618579

**DRAGON 32**, 6 months old, still in original box, £30 of games software Tel: Stratford-upon-Avon 642635

**DRAGON 32 + joysticks**, 22 games worth £420. In excellent condition, will sell for £235 or will split software separately. Tel: Hull 52572

**DRAGON 32**, joystick, 22 tapes, 1 month old, value £420, yours for £235 onto, will separate. Mr Carr, Hull 507683.

**DRAGON 32**, joysticks, recorder, books, leads, 6 cassettes, Berserk cartridge, just over £300, sell for £200 onto. Tel: Chelmsford (0245) 62008.

**DRAGON 32**, mint condition + joysticks, £150 software + manuals/books, £210 onto. Tel: 0422 85009 after 8 pm.

**DRAGON 32**, 1 week old, pair of joysticks, 1 games cartridge, machine code book, £200 or exchange for BBC Model A. Tel: 0602 215810.

**DRAGON 32**, £100 of software, joysticks, books, worth £250, £250 onto. Tel: Stoke-on-Trent (0782) 413759 (5 pm).

**DRAGON 32 + Tandy colour printer** and extras, £280. Tel: 648 3924 (daytime).

**DRAGON 32**, 6 months old, complete with all leads, cassette recorder, instruction manual, books, joysticks, 7 games, £180. Tel: 0793 763960.

**DRAGON 32**, 6 months old + 2 joysticks, Berserk cartridge, 6 games (Donkey King, Phantom Slayer etc), 3 Tandy books, games book, magazines (Coconuts) (3), Rainbow (3), Dragon User, all worth £300+. Could deliver, £220 onto. Tel: Leeds (0532) 622004

## Tandys for sale

**TRS 80 COLOUR COMPUTER**, 32K VCR recorder, joysticks, cassette + cartridge software, learning lab, books etc, cost nearly £700, accept £350 onto. Tel: 061-370 2162.

**TANDY CCP 115**, colour graphics printer plotter, with spare paper + pens, £120 Tel: Coventry 618579.

**SWAP ADVENTURELAND** for any other Vic adventure, except for Pirates Cove. Tel: 041-942 8146.

**TANTRY TRS 80**, Model 1 Level 2, 16K, CPU + joystick + software, £125 onto. Tel: 0635 21419 after 8 pm.

## Commodores for sale

**COMMODORE VIC20 + C2N cassette unit + 4th language cartridge**, £90 onto. Tel: Guildford 576252.

**COMMODORE 64** with the latest model tape recorder (C2N) and reference guide manual and 11 games worth nearly £100. Total value about £520 guarantee — sell for £470 onto. Tel: 01-450 4856

**SPECIAL VIC20 8K internal memory + 8K expansion**, high resolution Rom, machine code monitor, C2N tape, books, joysticks, software including Backgammon, Adventureland, £225 onto. Tel: 061-431 3553

**VIC20 + cassette unit + super expander cartridge**, programs and cartridge + adventure cartridge and cassette software, £190. Tel: Egham 34643 after 6 pm.

**VIC20 + cassette recorder, joystick, + software swap for 48K Spectrum or £130** Tel: 0536 741651.

**COMMODORE 64** with tape and software — manual and leads, £275 onto. Tel: 0625 828549

**VIC20 + tape recorder — programmes + Programmers Reference Guide + 22 copies of Personal Computer World (in binders), in very good condition. Cost £260 Accept £180 or very near offer** Tel: 01-866 6321

**VIC20 CARTRIDGES** to sell. Jelly Monsters, Omega Race, Starbatt, Road Race, Radar Rat Race, £15 each. Adventures include all five Scott Adams £17 each. Also Vic 20 software to exchange. Tel: 01-387 8751

**COMMODORE 64 + C2N cassette recorder**, complete with joysticks and software, £330 onto. Tel: Malvern 61602

**VIC20, C2N cassette unit, etc.**, £135 Tel: 01-407 2667.

**VIC20** with cassette deck, super expander, five cartridges, cassettes, joystick and books — £250, worth £370 — call Tenby 2139 after 4.20.

**VIC20** plus C2N cassette unit, 8K Ram, super-expander cartridge, books, manuals — £150 — call 01-558 5631 after 6 pm.

**COMMODORE 16K RP**, £30. Tel: Leigh 675514.

## EX-Demonstration Model

**VIC20** (under guarantee), plus C2N cassette deck. Also software + joystick, mint condition hardly used, £150. Tel: 01-841 3342.

**VIC20, 16K RP + cassette recorder**, £160. Tel: Tamworth 288393.

**VIC20** plus C2N cassette, joystick, as new, £130. Tel: 0536 741651.

**VIC20**, cassette, three cartridges, software, joystick, Basic PI, excellent condition, worth £300 accept £175 Tel: 02993 5548.

**COMMODORE 64, £280 onto**. Only 2 months old. Tel: Tunbridge (0732) 361920.

**VIC20 + 3 and 16K, Programmers Reference Guide, VIC Revealed, Sargon Chess, £155 Tel: (0732) 381920.**

**VIC20 8K Ram pack**, little used, £32 onto. Tel: 061 881 4391 (Manchester).

**SPEECH SYNTHESIZER** for the Commodore VIC20, swap for extra memory. Tel: 0772 25385.

**VIC20** still under guarantee with cassette recorder and dust cover, + mag + games cassette, £170. Tel: 021 327 4986

**COMMODORE PET 4032**, 11 inch screen, loq kit, viscale, lots of books, cover, 18 months, £370. Tel: 01-440 1553, 01-445 7771

**VIC20, 21K cassette deck, joystick, books, 9 cartridges, including Quakers, Scramble, Blitz, Vicman, etc, all under £30 each Tel: Sandon 270081**

**VIC20 SUPER EXPANDER**, £25. Tel: 01-808 6450.

**COMMODORE 64 + C2N cassette player**, University Lecturer, must sell, £350. Tel: Bracknell 20539

**VIC20 + cassette, Adventures + Adventureland cartridge**, Vicman, Amek, Asteroids, Vic Panic, over £60 other games + utilities, program reference guide, three metre video cable extension, all in good condition, £195 onto. Tel: Bolton (0204) 705892 (evenings)

**VIC20, four months' old, swap for ZX Spectrum** Tel: Tenby 3042

**VIC20, £50, Super Expander cartridge** £20, C2N cassette deck £30, joystick £5, Omega Race £15. Tel: Crayford 56911 (after 8 pm)

**VIC20 + tape recorder + 8K Ram + joystick + £90 software + Vic Innovative Computing + Vic Revealed**, £150. Tel: Basildon 45168.

**VIC20, five months old, 16K memory + cassette recorder**, £150. Tel: (Cardiff) 595784.

**VIC20 + 3K + 16K + tape deck, Introduction to Basic 1 & 2, joystick, maths and English revision cassettes, £75** **III** software, five months' old, excellent condition, £190. Tel: 0554-820561

**VIC20, 8K Ram, £25, 3K Ram, £15, Super Expander, £18, Vic Stockcontrol, £10, Introduction to Basics, Part 1, £8, Sargon II Chess cartridge, £18, The Court cartridge, £15. Other software available** Tel: (Huntingdon) 0480-72170.

**VIC20 COMPUTER** + C2N cassette recorder + 16K Ram, £100. Tel: Taunton 8726.

**VIC20** + C2N cassette recorder, 4-slot motherboard, 16K Ram expansion, Super Expander, machine code monitor, joystick, Jellymonsters, lots of software including The Invasion, Starquest, Chess and many more, £300. Tel: (0522) 702644 (after 5 pm).

**VIC20 HI-RES**, E18 onto. Tel: 01-579 2126 (after 6 pm).

**COMMODORE VIC** with tape unit, complete dust covers set, joystick, all manuals, Road Race Rom cartridge, much tape software, original Bugbyte Vicmen and Blitz. Excellent condition, £200 onto. Tel: Padgate 610490 (after 5 pm).

**VIC20 C2N CASSETTE DECK**, 16K memory, exp. joystick, two cartridges and software + magazines, £280 onto + five months' guarantee. Tel: 01-317 0999 (after 6 pm).

**VIC20** plus C2N cassette deck (with one year eight months' guarantee), plus software and joystick. Sell for £150. Tel: 01-841 3342.

**TAPE DECK** + joystick for Vic20 + two games, Parus and Alien Blitz. All brand new, will accept £45. Tel: Hamilton 0698 428015.

**VIC20 CASSETTE DECK**, synthesiser tape + book and games, £150. Tel: 340-9611 (ask for Kevin).

**VIC20** + C2N cassette drive and a Rom cartridge, £110. Tel: D. Heijer, Berry 744067.

**VIC** with cassette unit + 16K + 3-slot expander. Introduction to Basic Part 1, joystick, books, including Vic Revisited, software, £155. Tel: Billericay 66854.

## Ataris for sale

**ATARI VCB** with six cartridges, £25. Tel: 555 8317.

**ATARI 400** 40K cassette unit, disk drive, over £800 of games, utilities on cassette + disc, £150 of reference books, £800 onto. Tel: Basingstoke (0256) 55464 (evening/weekends).

**ATARI VCS** + eight cartridges including Amidar, Spiderman, Empire Strikes Back, Demon Attack, Frogger, Worth £340, sell for £180 onto. Tel: 081 2267502 (after 4 pm).

**ATARI 800** + 410 program recorder, joysticks, manuals including Dave Alan programs etc, five months old. Cost £530, sell for £385. Tel: Eastbourne 641719.

**ATARI VCS**, seven months old, including PacMan, Space Invaders and Combat, £70. Tel: 02406 5945 (evenings).

**40K ATARI 800**, with disc-drive, cassette and joystick + various games. Value new £900, selling complete system + manuals for £680. Tel: Southend (0702) 614041.

**DEMON ATTACK** for Atari VCS to exchange for Parker Star Wars cartridge. Tel: 04882 70318.

**ATARI VCS** + live cartridges, £99.95 onto. Tel: Bookham 52289 (after 5 pm).

**ATARI VCS** + two cartridges, £60. Tel: Cobham (Surrey) 3503 (after 5 pm).

**ATARI VCS** + six cartridges will swap for Spectrum or Vic20 or sell for £125 onto. Tel: 025-671 3445 (after 4.00 pm).

**ATARI VCS**, as new, Space Invaders and Combat, Atari bulletins, £75. Tel: Henfield 493694.

**ATARI 400** + recorder, Basic cartridges, joystick, Centipede, Missile Command, Defender, Asteron IV + manuals, four months old. Very good condition, £300 onto. Tel: 01-592 7048 (after 6 pm).

## Acorns for sale

**BBC MODEL B** with joysticks and software, £300. Tel: Huntingdon (0490) 890803 (evenings).

**TRS 80**, Level 2, 16K, green monitor, manual, numerous books/tapes, £250 onto. Tel: Leamington Spa 26506 (before 9 pm).

**ACORN ATOM**, Acorn built 12K + 12K via software, £125. Tel: Cooper, 01-904 9210 (evenings).

## For sale

**SWAP ATARI 800** + 410 recorder, joysticks, books + manuals including Dave's Atari, program etc, 5 months, for BBC II. Tel: Eastbourne 641719 (evenings).

**BUY, SWAP**, part-exchange or swap a Commodore 64 game. And we sell games from price range of £2.50 to £8.95. Tel: 01-500 4858.

**RETAILER SEEKS WIDER RANGE** of software stock for Dragon Spectrum/ZX81/Oric, Peacock, 7 Hawthorn Crescent, Burton-on-Trent.

**SHARP MZ 80K**, with Pascal and Basic tapes, as new, £110. Tel: 0926 59658.

**LOTS OF VIC20** software. Tel: Peter 577 2476.

**SWAP VIC20** Count Adventure cartridge for Mission Impossible Johnstone (Renfrewshire) 21586.

**MICROTAN 65** 8K Ram, Basic Rom, tool kit Rom, full keyboard, system rack, lots of games, programs + word processor. £370. Tel: Hollington (08832) 221 (Staffs). Also Epson MX80 FT1, with connecting leads for Microtan excellent condition. £270.

**SWAP SPECTRUM GAMES**, lots of all varieties, including The Hobbit, Cruising, Slippery Sid, Pitman and loads of others. Also a ZX81 with 16K joysticks, graphic Rom for £100 + lots of software. Tel: Penn 5738.

**E80 worth of ZX81 software for sale**, including 3D Defender, Scramble, Magogs, etc. Ring for details. Tel: 0480 74667.

**TEXAS TIE80A** cassette leads, joystick, TI Invaders, 6-month-old, £180, or split Tel: 061-226 1335.

**16K RAM pack** for ZX81 for £18, offers welcome. Tel: 01-722 7425 (after 6 pm).

**ELFTONE** tape recorder with 3-pin socket + counter, suitable for Oric 1. £29. Tel: 445 5989.

**EXCHANGE** your software with me. Send an sse to M. A. Valentine, 101A Underdale Road, Monkmoor, Shrewsbury, Shropshire SY2 5EF.

**SHARP MZ 80K**, 48K Ram, R/TTY Interface, fitted transmitter and receiver software, Morse code decoder software, nights machine code, software, also other software books + magazines. Asking £320 onto. Tel: Atherton 691140.

**ORIGINAL SPECTRUM** software for sale, Escape £3.50, Maze Man £3.50, Night Flight £4.50, Spectral Invader £3.50, Time Gate £5.50, Drafts £5.50. Write to: 39 Framfield Road, Uckfield, East Sussex TN22 5AH or tel: 0825 2514 (Saturday between 12 am and 2 pm).

**ATARI VHS tapes**, Pacman £20, Defender £20, Basketball £10, Skiing £10, Demon Attack £15, Space Invaders £15. Please ring 958 6181.

**INTELLIVISION** + Soccer, Basketball, Horse Racing, Space Battle and Tennis cartridges, excellent condition, £150. Tel: Kings Lynn 62234 (evenings).

**DAI 48K** improved keyboard, user image, £560 onto. Tel: 01-670 5909.

**TIGER 4040**, 7 months old + cassette recorder + leads, £110 onto. Tel: 04865 2887.

**VIC SUPER EXPANDER** cartridge, £25. Tel: 804 6450.

**BRITON COLOUR TV GAME** + Subutedo table soccer + MS Logic 5, for a 1K or 16K ZX81 with leads. Tel: Neil 061-508 6126 evenings.

**SWAP OR SELL VIC20 GAMES**. Tel: 01-579 2129 also cartridges.

**PHILIPS G7000** with three cartridges, little used, in mint condition, cost £111, will sell for £60. Tel: Lytham 733077.

**LINUX COMPUTER**, six weeks old, unwanted gift, £220. Tel: Doncaster 66528.

**SPECTRUM 48K** plus cassette recorder, 3 months old, £180. Tel: Crawley 512606 (after 6 pm).

**SWAP, Apple II Euro + for any software**. Tel: Harrow 9527378.

**20 INCH, b/w television**, excellent picture, perfect working order, £15. Tel: 051-3395894 (after 4 pm).

**SWAP, Vic cartridge, Adventure Land for Count or Voodoo Castle**. Tel: 05432 22482.

**CBM 16K Ram, Avenger, Sargon II, Chess, 3 Stick**, Intro to Basic I and II, innovative computing book, new £160, £100 onto. Tel: 074488 2325 (after 6 pm).

**RD Digital tracer**, mounted on a board, £40. Tel: 0274-727985.

**SWAP Spectrum Football Manager** for Pimlico or Black Crystal Adventure. Tel: 0632-673203 (after 5 pm).

**VIC 4TH cartridge**, swap for Super Expander or switchable Ram or 2 games cartridges. Tel: Norwich 0603-409534.

**SWAP, 48K Spectrum for 16K ZX81 plus 200**. Tel: 01-460 4603.

**VIDEO MASTER, Star Chess**, £75. Tel: 01-304 1819 (after 4.30 pm).

**FURTHER PROGRAMMING** for ZX Spectrum (Shiva), £4.50 + Cartridge Colour Collection (book + tape). £6. Tel: 01-348 0966.

**MIBITION IMPOSSIBLE** for Vic 20. £15. Donny Kemp, Wacky Walkers cassettes. £10. Tel: 01-500 9558.

**VIC 20**, software to swap. Tel: 01-205 7469.

**WARRIOR + Star Trek** for 16K ZX81 (Marconi Software). £2 each. Tel: 0908-568216.

**CARTIRDGES** including Demon Attack, Sub Hunt, Tron, 14 in all (Mattel Television), from £10 each. Tel: 041-882 8788.

**TI 99/4A**, unwanted Christmas present, includes speech synthesiser, speech editor module, TI Invaders module, Munchman module, joysticks, dual cassette cable, audio, cassettes and magazines. All for £250. Tel: Doncaster 0302-723571.

**MZ 80A**, as new + software, books, etc., £395 or exchange system. 01-908 1460.

**ADULT DRAGON** owner wishes to exchange tapes and cartridges. Eponas, large and varied selection from the serious and Teletext through to games and learning, tape/cartridge. Tel: Stevenage 58707 (after 6 pm).

**OVER £100 SOFTWARE**, will sell for £70, or will swap for other originals. Tel: Chester (0244) 378549.

**SPECTRUM** software, swap or sell. Tel: Chester 376682.

**VIC 20, Mission Impossible, Type-a-Tune + Cosmics**, swap for the Vic mvc monitor cartridge. Tel: East Kilbride 42853.

**40K LINUX**, 2 weeks old, 1 year guarantee, all leads, PSUs, books, manuals + software, all in perfect condition, £220 no offers, will swap for BBC model A. Tel: Waltham Cross 28173.

**VIC 20** cartridges for sale. Includes Gorf, Chess, 151 such, also Star Battle, Road Race + many, many more, £12 each. Tel: 01-574 4122.

**VIC20 CARTRIDGES**: Jelly Monsters, Omega Race, Road Race, Star Battle, Rat Race and Meteor Run — £14 each. Scoot Adam's Five Adventures for £17 each. Rabbit New 6 including Orbs Linkwell, £10. Tel: 01-387 8751.

**SUPER STAR** multi-mode CB transceiver, exchange for printer compatible for BBC. Tel: Mr Guthrie, Enith 33474.

**ARTHON EXPANSION UNIT**, for Vic20, £65 onto. Tel: 01-650 9701.

**5 SPECTRUM BOOKS**, Inc Spectrum Handbook, £20. Tel: 0555-71502.

**VIC20 CASSETTE**, Pirate Cove swap for Vodoo Castle or Count Dracula. Tel: Atherton 89519.

**SWAP, Arion 8K expansion pack + many 8K games for your Commodore 64K pack**. Tel: Stevenage 811634 (after 7.30 pm).

**SHARP 1780K**, 48K, Ram, manuals, games, tapes, etc., £250. Tel: Peterborough 204255.

**SWAP, Alan 800 + 410 program recorder, joysticks, manuals in Dave Alan programs etc, 5 months old, for similarly equipped BBC computer Eastbourne 641719.**

**HOMING PIGEONS** + Bowling for the 16K ZX81, exciting programs written in Basic. For both games on one tape sell a cheque to the value of £2 to C. Hume, 38 Long Craig Terrace, Kinghorn, Fife KY3 9TD.

**64K TUSCON SYSTEM Z80A**, working at 4 megs, CP/M disc system with 180K formatted, including CP/M \$100, cost £1,550, sell for £1,000 or swap for something useful. Tel: 466 6246.

**ATARI SOFTWARE** for Atari 400/800, 3 cartridges, Star Raiders, Missile Command, Asteroids, the three £56. Protector (cassette), £12. Tel: 0702 201637.

**140 COMPUTER MAGAZINES**, all popular titles, sell for £13 or swap Dragon Fort. Tel: Ware (0320) 68264.

**INTEL SYSTEM** development kit for 80/85, any offers. Tel: Layer 342 after 7 pm.

**SHARP MZ 80K**, personal computer, 48K model. Immaculate condition, hardly used, as new, cost £400, selling for only £350 onto, also includes dust cover, green screen and many programs. Tel: 061-773 3445.

## Wanted

**WANTED, BBC MICRO COMPUTER**, Model A or B, must be in good condition. Tel: Havant 473068.

**VIC20**, swap Omega race for any adventure cartridge. Tel: Stevenage 043 4085.

**WANTED, BBC MODEL B**, plus cassette and manuals etc, pay up to £320. Tel: Worthing 0903 8783.

**WANTED, FELLOW SPECTRUM OWNER**, living in or around Harpenden for exchanging software and ideas. Tel: Harpenden 69152 (after 7 pm).

**I WANT A BBC MODEL B**, instant cash paid. Tel: Harpenden 69152 (after 6 pm) with full details of your BBC.

**WANTED, BBC MODEL B** with or without accessories and software. Tel: 01-741 1745.

**WANTED, Cassette Recorder, Jack, Din Plugs, Counter**. Tel: Chester (0244) 376548 (6-8 pm).

**WANTED, BBC 32K A or B Micro-computer**. Must be in good condition. Tel: Coventry (0203) 504485 (after 5 pm).

**SWAP VIC20 Asteroids** for other Vic20 games. Tel: 0341 260726 (after 6 pm).

**WANTED, BBC MODEL B** and software, offer exchange of Yamaha 250cc, 1981, US Custom motorcycle, 1,000 miles only, immaculate. Tel: 0443 671227.

# NEW RELEASES

## TEeing-OFF

*Vic Golf* uses defined graphics and split screen techniques to enable you to play the game on your micro.

The game requires 3K extra memory and a joystick. Those who have brought material from the manufacturers of the tape — CP White — should note the new address given below.

**Program** Vic Golf  
**Price** £4.00  
**Micro** Vic20 (+3K and Joystick)  
**Supplier** CP White (Services) 52 Northfield Ave West Ealing London W13 9SY

## KRAZY KONG



*Krazy Kong* is a ZX81 version of the popular arcade game of the same title.

The game features a pyramid you must climb, whilst knocking out the supports for *Krazy Kong* as you go. You reach him by climbing various ladders — and avoiding the rocks and barrels which are thrown at you.

The game has three screens and, it is claimed, all the features of the original.

**Program** Krazy Kong  
**Price** £3.95  
**Micro** ZX81 16K  
**Supplier** Personal Software Services 452 Stoney Stanton Rd Coventry CV6 5DG

## INTO GEAR

Although lagging behind the seemingly endless range of books produced for the Spec-

trum, the Dragon book market is gradually getting into gear.

*The Power of the Dragon* is a new book from Microsource which uses 30 programs to illustrate different programming techniques. Each program has a line by line commentary, explaining how the program works.

**Book** The Power of the Dragon  
**Price** £5.95  
**Micro** Dragon 32  
**Supplier** Microsource 1 Branch Road Park Street St Albans (+50p P+P)

## PROCESSED

Although *Telewriter* looks like becoming the flagship wordprocessor for the Dragon, its price (over £40) may lead people to look elsewhere.

*Textstar* is a Dragon wordprocessor which offers most of the usual wordprocessor functions like line insertion, find and display string, etc.

Total file length is up to six pages of A4 text. It is one of a developing range of Dragon programs from Personal Software Services.

**Program** Textstar  
**Price** £12.95  
**Micro** Dragon 32  
**Supplier** Personal Software Services 452 Stoney Stanton Rd Coventry CV6 5DG

## PACKAGE DEAL

Ramtop is a company offering a complete package for the small business.

The package consists of three cassettes for the 48K Spectrum — a sales journal, a sales ledger and a purchase ledger. The three cassettes come with an explanatory booklet and incorporate routines which enable them to be used with a ZX printer.

**Program** DIY Book Keeping  
**Price** £24.95 per tape  
**Micro** Spectrum 48K  
**Supplier** Ramtop Software 12 Milnthorpe Rd Burtonwood Warrington Cheshire

## WORD GAMES



Few single programs have had better advance TV coverage than *Scrabble* from Psion.

For some reason this computer version of the popular board game has grabbed the media's attention — perhaps because the idea of a computer playing around with words has overtones of artificial intelligence.

The cassette comes in a box with an explanatory booklet. The rules of Scrabble are outlined, as is the use of the computer. One of the many options included in the game is a chance to see the computer thinking about its next move — this involves letters whizzing about as it searches through all the possible permutations.

It is perhaps not surprising that such a likely best-seller comes at a luxury price — £15.95 — but then I suppose someone has got to be paid for typing in the dictionary of words the computer understands — there are over 11,000 of them.

**Program** Scrabble  
**Price** £15.95  
**Micro** Spectrum 48K  
**Supplier** Psion 2 Huntsworth Mews Gloucester Place London NW1 6DD

## SPIDER'S WEB

*Horace and the Spiders* is the latest edition to the Hungry Horace series.

The plot sounds like a mixture of half a dozen arcade games put together. Firstly,

Horace has to climb the hills to the Spider mountains, jumping over the spiders that run at him. Then, he must negotiate the spider bridge, by using dangling threads as ropes, until finally he reaches the spider cave.

Once in the cave, Horace can attack the spiders and make holes in their web. Horace has four phials of serum which will protect him from spider bites.

Psion is now describing this game as an adventure and it certainly has a complicated plot.

What next I wonder — a 48K special *Horace* enters *Mastermind* perhaps?

**Program** Horace and the Spiders  
**Price** £5.95  
**Micro** Spectrum 16/48K  
**Supplier** Psion Melbourne House 2 Huntsworth Mews Gloucester Place London NW1 6DD

## SINGING PI



*Pimanian* was an extremely successful game when it was issued on the Spectrum — indeed it would probably be rated one of the very best games for the machine.

It is now available for the Dragon 32 with most of the features of the original including an all singing and dancing PI man, a dreadful single on the reverse side, and of course valuable prize.

**Program** Pimanian  
**Price** £10  
**Micro** Dragon 32  
**Supplier** Automata 65 Osborne Rd Portsmouth PO5 3LR

# NEW RELEASES

## SHOP COP!



What with all the advertisements anyone could be forgiven for thinking that *Catcha Snatcha* from Imagine Software had been out for some time — in fact, I have only just received a copy.

In the game you are a store detective whose job it is to look after the premises. Tasks include collecting lost property and lost children and even evacuating the store when bombs are found! All this in conjunction with looking out for shoplifters.

The aim of the game is to retain the manager's confidence — this is expressed in a

percentage derived from the number of written warnings received.

**Program** *Catcha Snatcha*  
**Price** £5.50  
**Micro** Vic20  
**Supplier** Imagine Software  
 Masons Buildings  
 Exchange Street East  
 Liverpool Merseyside  
 L2 3PN

## FLASHING SCREEN

Salamander Software has issued a graphics package for the Dragon 32.

The package facilitates use of the Dragon's graphics and enables text to be mixed with high-resolution, as well as various drawing routines.

The program requires one joystick and uses a flashing screen cursor to position lines on the screen.

**Program** *Graphics System*  
**Price** £9.95  
**Micro** Dragon 32  
**Supplier** Salamander Software  
 27 Ditchling Rise  
 Brighton  
 East Sussex

## 1K GAMES

Many people who buy a ZX81 lament the fact that there is nothing they can buy for their

machine, unless they also buy the extra 16K Ram.

However, Micromega is a company specialising in games for the 1K machines. *Arcade Action* is a games pack consisting of *Greedy Gobbler*, a maze hunt game, *Extra Terrestrial*, in which you are the stranded alien, and three other arcade type games.

**Program** *Arcade Action*  
**Price** £4.95  
**Micro** ZX81  
**Supplier** Micromega  
 230-236 Lavender Hill  
 London SW11 1LE

ture game bar none" from *The Hobbit*.

The 48K Spectrum program, which will be released on July 15, uses a new operating system *MOVISOFT* and boasts a number of *Hobbit*-like features. There are 20 significant characters, each with their own aims and objectives.

You are a minor god set the task of recovering Odin's Golden Helmet. To complete this you will also have to master three lesser tasks, one of which is to rescue *Eiden* — a maiden responsible for the Golden Apples which keep the gods youthful.

## MEANIE HUNT

*Bonka* is a game for the Dragon 32 based on the popular *Space Panic* arcade game.

Using the keyboard you must kill off the meanies by trapping them in holes dug with your hammer. There are four speed options, as well as a choice of how many meanies you have to start with.

*Bonka* is the first of a number of new releases for the Dragon written by John Morrison.

**Program** *Bonka*  
**Price** £7.95  
**Micro** Dragon 32  
**Supplier** J Morrison (Micros)  
 2 Glendale Street  
 Leeds LS9 9JJ



The game's designer, Legend, claims that the program involves a sophisticated degree of interaction. For example, should an enemy overhear you telling a friend some important information, he will try to ruin your plans.

Legend stresses that the personality of each of the characters is genuinely independent "as opposed to pseudo-independent behaviour like Thorin sitting down and singing about gold or Gandalf walking off with your door for no reason".

The moving graphics are reportedly of cartoon quality, with both background and foreground movement illustrating the events of the plot.

Pretty impressive claims. *Hobbit* fans will no doubt feel both intrigued and sceptical . . . Watch this space.

## MYSTERY SET

*Design and Restore* is a program that enables you to create characters for games and foreign languages and Load and Save them as you wish.

The program comes complete with already designed characters for Asteroids, Pacman and Robot, the last being a "mystery set".

**Program** *Design and Restore*  
**Price** £9.99  
**Micro** Vic20  
**Supplier** Kayde Electronic Systems  
 The Cone  
 Great Yarmouth  
 Norfolk NR30 1PJ

## COMING SOON!

*Valhalla* is an animated graphics adventure whose undisguised intention is to steal the title of "best micro adven-

*New Releases* is designed to let people know what software is coming on to the market. If you have a new game or utility which you are about to release send a copy and accompanying details to: New Releases, Popular Computing Weekly, 19 Whitcomb Street, London WC2 7HF.



# Ziggurat



## Organising society

"A technology has no value outside of social significance — alone it is dead metal."

So starts an interesting pamphlet by Paul Strassmann, Vice President of Xerox.

Just published, the pamphlet is a modified version of probably the most successful speech at the IT'82 Conference in the Barbican last December. At the time, the presentation was successful because it was one of the few which actually used information technology to good effect, and because it was one of the most intelligent and intelligible.

The central theme of Strassmann's talk was the productivity of organisations, and how the introduction of information technology can transform the role of people and of organisations. Paul Strassmann's first aim is the analysis of tasks, to examine how sensible automation can benefit productivity and quality. He points out that efficiency is achieved by eliminating many labour-intensive office tasks and he notes that such action will materially enlarge the work of the individuals who remain.

Attention is then turned towards the nature of administrative systems. The traditional structures are being changed — "management is not simple any more". Though the procedures remain the same, management, operations and customers are becoming increasingly diverse. This need to address wider horizons has been met by "adding more standard procedures without altering the traditional organisational concepts of division of labour". The trend towards centralisation and the increase in procedural complexity is measured by what he terms the "Parkinson Ratio" (after C Northcote Parkinson).

Parkinson's Ratio is given by the number of internal communications that are necessary to satisfy a single useful communication to a customer. Paul Strassmann reckons that for a very efficient organisation in a competitive industrial sector, it can take about 20 to 30

internal information transactions to satisfy a single customer enquiry.

In the public sector the average number of transactions is thought to be in excess of 100! The suggested reason is that only highly standardised methods of handling customers are fair and equitable to the public.

Information technology, intelligently applied, can help to reduce Parkinson's Ratio, by reducing the number of needless communications.

Strassmann's first key to information technology is, thus, the need for new forms of organisation made possible by IT. The acquisition of modern technology does not help unless new systems are created to make use of it in ways that are culturally acceptable. Smaller numbers of people will be needed to manage and organise information and this should (can but might not) be used to expand the provision of services.

"The huge coming expansion I see in the demand for information, on a global scale, will come from information being incorporated into socially useful services," says Strassmann optimistically.

Paul Strassmann considers that full employment is possible in productive or unproductive societies, and what matters is the total output of society. If output does not change with automation, then unemployment is produced. Or, to put it the other way, for a growth in output to be achieved, automation is now a necessity.

But what to do with the increased output? Strassmann suggests that the increased output be used to invest in the service sector's effectiveness, and that we should increase "value added" before cutting costs. By value added, he means that improvement investments should be channelled where they will increase value added through new services.

Improved effectiveness of organisations is derived from reduced overhead costs and decreased burdens from over complex administrations.

For maximum benefit, information technology should be used to simplify organisational processes rather than just to mechanise existing office procedures. Eliminating job steps is the key to simplification.

But the vital point is that we must think in terms of "new roles for people in organisations and in the framework of a new social economy based on new services".

The pamphlet by Paul A Strassmann is available from Rank Xerox, 338 Euston Road, London NW1.

Boris Allan

## Top 10

### Dragon 32

- 1 (1) The King (Microdrive)
  - 2 (2) Space War (Microdrive)
  - 3 (3) Planet Invasion (Microdrive)
  - 4 (4) Dragon Trek (Salamander)
  - 5 (5) Defence (Microdrive)
  - 6 (6) Alcatraz (Microdrive)
  - 7 (7) Wizard War (Salamander)
  - 8 (8) Chess (Dragon Data)
  - 9 (9) Katerpillar Attack (Microdrive)
  - 10 (10) Basic Tutorial (AmigaSoft)
- \*Cartridge (Figures compiled by Books & Co, London)

## Top 10

### Spectrum

- 1 (1) Flight Simulation (Palion)\*
  - 2 (2) The Hobbit (Melbourne House)\*
  - 3 (4) Penetrator (Melbourne House)\*
  - 4 (3) Transylvania Tower (Richard Shepherd)\*
  - 5 (—) 3D Tanks (DK Tronics)
  - 6 (—) Planet of Death (Arcade)
  - 7 (6) Horace Goes Sizing (Palion/Melbourne House)
  - 8 (8) Vu-3D (Palion)\*
  - 9 (—) Sentinel (Abacus)
  - 10 (—) Escape (New Generation)
- \*Requires 48K  
\*Figures compiled by WH Smith and Son Ltd

## Top 10

### Atari

- 1 (1) Zargon (Datasoft)
  - 2 (6) Astrochase (First Star)
  - 3 (—) Spider Invasion (Coast)
  - 4 (4) Hellic Ace (Microprose)\*
  - 5 (2) Mine 2049er (Big Five)
  - 6 (—) AE (Broderbund)\*
  - 7 (9) Pharaoh's Curse (Synapse)\*
  - 8 (—) Survivor (Datasoft)
  - 9 (—) Canyon Climber (Synapse)
  - 10 (10) Protector 2 (22K disc, £49K disc)
- \*Figures compiled by Calisto Computers, Birmingham 021-632 6458

## Top 10

### Vic 20

- 1 (2) Panic (Bug Byte)
  - 2 (1) Asteroids (Bug Byte)
  - 3 (8) Cosmoids (Bug Byte)
  - 4 (5) Wacky Walkers (Imagine)
  - 5 (—) Race (Commando)
  - 6 (4) Arcadia (Imagine)
  - 7 (—) Super Expander (Commando)
  - 8 (9) Blitz (Commando)
  - 9 (7) Introduction to Basic Part 1 (Commando)
  - 10 (16) Amok (Audionic)
- \*Cartridge (Figures compiled by Books & Co, London)

### BBC\*

- 1 (1) Rocket Raid (Acornsoft)
  - 2 (2) Planetary (Acornsoft)
  - 3 (4) Snapper (Acornsoft)
  - 4 (5) Monsters (Acornsoft)
  - 5 (—) Philosophers Quest (Acornsoft)
  - 6 (—) Arcadians (Acornsoft)
  - 7 (10) Creative Graphics (Acornsoft)
  - 8 (—) Chess (Program Power)
  - 9 (—) Meteors (Acornsoft)
  - 10 (—) Castle of Riddles (Acornsoft)
- \*All Model B.  
(Figures compiled by Micro Management, Ipswich 0473 59181)

### ZX81

- 1 (2) QS Scramble (Quicksilver)
  - 2 (5) Mazogs (Bug Byte)
  - 3 (9) Night Gunner (Digital Integration)
  - 4 (1) Flight Simulation (New Generation)
  - 5 (3) Monster Maze (Artic)
  - 6 (4) Galaxians (Artic)
  - 7 (7) Chess (Palion)
  - 8 (6) Space Raiders (Abacus)
  - 9 (8) Avenger (Abacus)
  - 10 (10) Asteroids (Silversoft)
- All 16K  
\*Figures compiled by WH Smith and Son Ltd

### Topics

- 1 (4) Spectrum Machine Language for the Absolute Beginner, Tang (Melbourne House)
  - 2 (1) Enter the Dragon, Carter (Melbourne House)
  - 3 (5) Assembly Language Programming for the BBC Micro, Bumblebee (Macmillan)
  - 4 (—) Complete Fortn. Winfield (Sigma)
  - 5 (2) BBC Micro User V122, Jones (Sigma)
  - 6 (3) The BBC Micro User An Expert Guide, James (Osborne)
  - 7 (2) Z80 Assembly Language Programming, Leventhal (Osborne)
  - 8 (7) Vic Programmer's Reference Guide, Commodore (Commodore)
  - 9 (9) Computer's First Book of Vic, various authors (Computer)
  - 10 (—) Commodore 64 Programmer's Reference Guide, Commodore (Commodore)
- (\*Figures compiled by Witford Technical Books, Witford 0923 23234)

# Puzzle

## Down on the farm

### Puzzle No 57

Within easy walking distance from Lower Muddecombe, are four farms, Hilltop Farm, Cowslip Farm, Dewdrop Farm and Mayfield Farm.

The farmyard of each is in the shape of a right-angled triangle having a perimeter fence of exactly 360 yards in length. Also, all the sides of the farmyards are an exact number of yards.

Curiously, though, the areas of each is different, ranging in size in the order given above, with the largest farmyard at Mayfield.

The other evening the four farmers were enjoying a drink together in The Bull when they each made the following statements:

Farmer Giles: My farmyard is the largest.

Farmer Miles: I live at Cowslip farm and have the longest side of all the yards.

Farmer Henry: All of my three fences are an even number of yards.

Farmer Stiles: My farmyard is the smallest.

Unfortunately, none of these statements was true. Who lives where?

### Solution to Puzzle No 52

This problem requires us to find 10 primes with a common difference. The lowest prime would represent the number of soldiers sent out on the first day, and the common difference would equal the number in a full regiment. The primes are checked for in the subroutine at Line 300

```

10 LET N = 3
15 LET L = N
20 GOSUB 300
30 IF F<>0 THEN GOTO 140
40 FOR D = 1 TO INT(N/1.1) STEP 2
50 LET M = N
60 FOR T = 1 TO 9
70 LET M = M + D
75 LET L = M
80 GOSUB 300
90 IF F<>0 THEN GOTO 130
100 NEXT T
110 PRINT M, D
120 STOP
130 NEXT D
140 LET N = N + 2
150 GOTO 15
160 LET F = 0
170 FOR B = 3 TO (VAL STR$ SCR L) STEP 2
180 IF L/B = INT(L/B) THEN LET F = 1
190 NEXT B
240 RETURN

```

This gives the results: 210 soldiers in each regiment, but on the first day only 199 soldiers were sent. After 10 days 2,089 men had been sent with 11 held back from the first regiment.

### Winner of Puzzle No 52

The winner is: Angus Kerr, Golf Road, Bieldside, Aberdeenshire, who receives £10.

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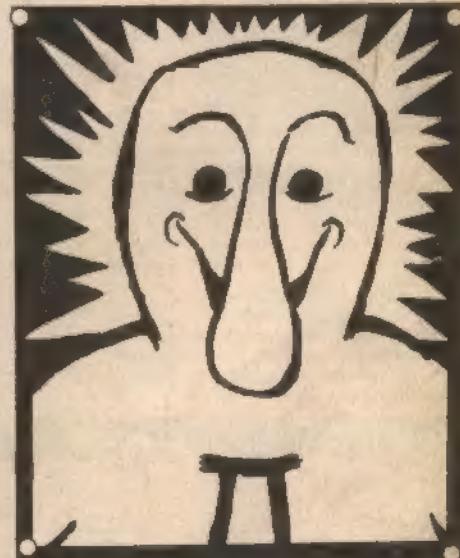
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